THE SHARON TEMPLE

The Children of Peace began this version of Solomon's Temple in 1825 and, working when they could, finished it in seven years. "We have built a house to sacrifice to God, feed the hungry and clothe the naked." The Temple was used two or three times a year for special meetings of offering, regular meetings or "Love Feasts" were held in a church which stood to the north of the Temple. The "Davidite" Sect became extinct about 1886, twenty years after the death of David Willson, who founded it about 1803-4. The Temple is now a museum.

DEPARTMENT OF PLANNING AND DEVELOPMENT

THE HONOURABLE W. K. WARRENDER, Minister

A. H. Richardson, Chief Conservation Engineer

UPPER HOLLAND VALLEY CONSERVATION REPORT 1953

ONTARIO

TORONTO

1953

Two hundred copies of this report have been prepared, of which this is

Number ______68______

Honourable W. K. Warrender, Minister,
Department of Planning and Development,
Parliament Buildings,
Toronto, Ontario.

Honourable Sir:

I take pleasure in transmitting herewith a Conservation Report on the Holland Valley.

The report is in five sections: History, Land Use, Forestry, Water and Wildlife.

Yours very truly,

A. H. Richardson
Chief Conservation Engineer

Toronto, April 8, 1954.

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PHOTOGRAPHS

Most of the photographs in this report were taken by members of the staff of the Conservation Branch, but thanks are expressed to the Department of Lands and Forests for permission to use the four photographs taken in Vivian Forest.

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* On account of their complexity or size, Figures 2, 8a, 8b, 9, 10, 12 and 13 have been omitted from the text of this report. Figures 8a and 8b have been reproduced in limited quantity and furnished to all members of the Authority. If required they may be obtained by applying to the Ontario Department of Planning and Development. In the rare cases where the technical data shown on the other five charts are needed, they may be examined in the offices of the Conservation Branch of the above department at 863 Bay Street, Toronto.

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INTRODUCTION

Conservation has long been a subject of concern to the people of Ontario. This concern had to do originally with the protection of forests because of their importance as a source of revenue to the Province; but allied with this was the problem of wildlife management and the protection of source areas of rivers and streams. In Southern Ontario interest in conservation was indicated first by reforestation and woodlot management, but more recently this has broadened out to include flood and pollution control, improved land use and provision for recreation facilities.

While the progress in these activities has been steady up to the present, most of the programs heretofore were initiated by government departments. Recently, however, there has been a growing conception of personal obligation, especially where land use problems, farm ponds and small reforestation projects are concerned. On the other hand, control of flooding, summer flow and pollution, and large reforestation projects have come to be considered the responsibility of the community - the community in this case being the river valley.

With the advent of this new concept of personal and community responsibility in conservation, the Authorities movement was born, and the willingness of our people to undertake conservation in this way is indicated by the fact that in the last eight years 15 Authorities have been established, with a total membership of 256 municipalities and an area of 10,505 square miles.

The first step in establishing a Conservation Authority is undertaken by all the municipalities wholly or partly within a watershed. Two such municipalities must first by resolution petition the government to call a meeting for the purpose of ascertaining whether or not an Authority

should be established. Two-thirds of the number of representatives which the municipalities are entitled to appoint (on a population basis) must be present to make the meeting legal. If two-thirds of those present vote in favour of establishing an Authority a resolution is forwarded to the government. The Authority is then established by Order-in-Council and under the Act becomes a body corporate, including representatives from all the municipalities in the watershed.

While most of the Authorities were brought into being because of flooding within their areas, all were aware of the necessity of carrying out such supplementary measures as improved methods of land use, reforestation, proper woodlot management, prevention of pollution, investigation of underground water supplies, wildlife studies and recreation. But the Authorities were not equipped to carry out the extensive investigations that would indicate where such work should be done. Consequently the Conservation Branch of the Department of Planning and Development undertook to carry out the preliminary investigations as a service to the Authorities, to appraise, by means of surveys and reports, the conservation needs of each watershed, and to submit to the Authority in question a detailed report outlining the conservation measures that should be followed.

The survey work is grouped under five general headings: Land Use, Forestry, Hydraulics, Wildlife and Recreation. The scope of the studies made in each of these subjects varies with the condition and needs of the area under investigation, with the result that in the completed report the findings recorded for each subject are related to the problem involved. In addition to the five conservation topics indicated above, a study covering the history of the area is incorporated. This serves as a backdrop to the whole conservation problem of the watershed and compels the reader to understand the abuses of the past and the need for a diversified program in the future.

The starting point for all surveys is aerial photography; in preparation for the work which has been done on each of the watersheds covered to date, the area was first specially photographed. Before the survey is commenced in the field all such contributing data as maps, old records, photographs, unpublished reports and other useful information are thoroughly explored and recorded. While the survey is in progress similar data are gathered locally, and agricultural representatives, zone foresters, municipal clerks, other officials and private citizens are interviewed for additional material.

The results of these conservation surveys, together with the recommendations based upon them, are set down in the reports presented to the Authorities and intended to serve them as a blueprint. The carrying out of any scheme is not the work of the Conservation Branch of the Department of Planning and Development, which is not an operating department. Its active participation ceases when the planning is complete and the report is submitted, although it stands by to interpret the report and give advice and assistance in carrying out the plans recommended to the Authorities. The Authority must assume responsibility for initiating the schemes which it considers most urgent; it must also make approaches to the government departments or other bodies from which it hopes to get assistance.

If, for example, an Authority undertakes a scheme having to do with land use, it must seek assistance from the Department of Agriculture: if it involves a forestry or wildlife problem, then the Department of Lands and Forests is approached: if it concerns pollution the Authority must deal with the Department of Health. In the case of flood control, however, as there is no department of the government doing hydraulic surveys except the Conservation Branch, whose staff is not large enough to carry through the engineering works of several Authorities, the Authority must engage a consulting

engineer to do the final engineering and designing and to carry the work through the construction stage. Similarly, where an Authority undertakes a scheme which has to do with recreation, it must employ men specially trained in this work.

As the work being done by Authorities is a new approach to the conservation problem, in that the responsibility of carrying it out is left entirely in the hands of the Authority concerned, much directing and assistance have been necessary from the Conservation Branch, and in the case of six Authorities, a member of the staff of the Department of Planning and Development has been assigned to work in the watershed.

The Upper Holland Valley Conservation Authority was established by Order-in-Council on September 6, 1951, following an organization meeting which was held at Newmarket on July 26, 1951, when 5 representatives out of a total of 5 attended the meeting and voted unanimously in favour of establishing the Authority.

As mentioned above, the Department of Planning and Development, as a service to an Authority, undertakes to carry out a conservation survey of the valley for the guidance of the Authority, but the commencement of conservation work in the valley does not necessarily have to wait until such a survey has been made and the report presented. This is the case with many Authorities, and much excellent work has been done independent of the reports which have been prepared by this Department - for example, the Upper Holland Authority has already initiated a farm pond program.

The Upper Holland is one of the smaller watersheds and floods are a very minor problem. The major problem is one of land use including the reforestation of blow sand areas where tree cover is an essential to prevent erosion and loss of water. The second great problem is one of pollution and this could be partly alleviated by a more even stream flow which would be brought about by a good overall land use program. Reforestation, the introduction of good land use practices and

the encouragement of farm pond construction are the phases of conservation on which the Authority should concentrate.

– A. H. R.

RECOMMENDATIONS

RECOMMENDATIONS
STATED OR IMPLIED IN THIS REPORT

History

1. That where records, buildings and objects of sufficient interest exist, illustrating the life of the watershed during the period of development, the preservation of these relics be considered an aspect of conservation; and that where such records and other relics are the private property of individuals and corporations within the watershed, the Authority take definite measures to encourage their preservation by their owners or their commitment to proper care in libraries, museums, archives and other suitable repositories.

2. That when sites or buildings of this kind form part of, or are closely adjacent to, properties acquired by the Authority for reforestation or recreation, the possibility of including them in the scheme be considered.

3. That in such cases the Authority mark sites and see that such buildings are preserved and used for some purpose in connection with the project compatible with retaining their original character.

4. That, before carrying out any project, the Authority ascertain from the Royal Ontario Museum of Archaeology whether the area concerned is likely to contain archaeological material and if necessary arrange for the investigation of the site before operations make this difficult or impossible.

5. That the Authority place a marker on the paved road just south of Ballantrae, where the line of the trail from Duffin's Creek to Holland Landing crossed the line of the present road; and that a similar marker be placed opposite St. Andrew's College on Yonge Street, to mark the point where "Old Yonge Street" diverged from the

present road to avoid the creek which still flows in the College grounds.

6. That the Authority place markers to indicate the sites of some of the earliest mills, churches and taverns in various parts of the watershed, as, for example, the Royal Hotel in Holland Landing; the site of Eves's Mill in Newmarket; the Beman-Robinson House in Newmarket; and the Friends' Meeting House on Yonge Street.

7. That from the small number of sites and buildings of historic interest (in the wider sense used in these recommendations) to be found within the watershed, a few be selected for eventual inclusion in the activities of the Authority, besides those connected with recommended projects.

8. That wherever possible, the buildings be left on their original sites and continued in their original use or adapted to some suitable purpose in connection with the normal life of the community.

9. That the Authority provide as part of its recreation program an area or areas where buildings which it is desired to preserve may be re-erected when they cannot be retained on the original site.

10. That the Authority encourage in its work any institution or organization in the watershed that undertakes to house collections of objects of domestic, agricultural and industrial use and of pictures and documents illustrating the history and development of the area.

11. That in selecting the limited number of buildings and objects that can be preserved in this manner, care be taken to choose those that best illustrate the development of the area, without undue regard to age, association or artistic merit.

Land Use

12. That for purposes of demonstration, the Authority undertake a land use program concentrated on the three Little Valleys, namely Snowball, Wesley Corners and Sharon Creeks, studied in this report, and that this program be developed as follows:

    (a) That the Authority set up a Land Use Advisory Board to carry out the program.

    (b) That an agriculturist be employed part-time, commencing in the summer of 1954, who will acquaint landowners with the program and prepare a list of farmers willing to co-operate in carrying out plans for soil and water conservation as recommended by the Soils Advisory Service of the Ontario Agricultural College.

    (c) That a bulletin, to be known as the Little Valley Plan, be published in co-operation with the Ontario Department of Planning and Development, similar to the Avon Plan on the Thames, the Luttrell's Creek Plan on the Grand and the King Creek Plan on the Humber.

13. That the Authority arrange for special equipment to be made available to farmers for minor engineering works to control erosion and run-off. p. 37

14. That the Authority demonstrate soil conservation practices, including pasture improvement, on land which it may acquire. p. 36

Forestry

15. That every effort be made to establish the Authority Forest on the areas recommended. p. 34

16. That if the establishment of the forest proves to be impossible due to the high cost of land, the Authority work out a form of agreement to be made with landowners

which will ensure that tree cover be maintained and restored on these lands. p. 34

17. That the Authority appoint an Advisory Board to determine the best method of fire protection for plantations and woodlands within the watershed, in co-operation with the Department of Lands and Forests. p. 41

18. That a policy of aiding landowners to reforest marginal lands be implemented by the Authority. The Authority should provide a tree-planting machine which would be furnished to the landowner along with a tractor and a planting crew for a nominal sum. The Authority should further assist reforestation by subsidizing planting on land too rough, too steep and too wet for machine planting. p. 24

19. That the Authority provide a portable wood chipper which would be made available to farmers in the same way as the tree-planter. This could be used to clean up low-grade hardwood and weed trees in woodlots. The chips can be used in place of straw for cattle bedding and chicken litter and spread on the fields as humus. In some cases it may be possible to sell such chips to pulp companies.

<u>Water</u>

20. That the Authority make periodic measurements of the static levels or flows of municipal and other highly productive wells and deep wells around them in order to keep track of changes in the artesian pressures in areas of high consumption. p. 43

21. That the Authority stop unnecessary overflow from highly productive wells, which may cause lowering of artesian pressures, by capping the wells through agreements with the owners. p. 40

22. That the Authority examine the water of Holland River periodically and urge the municipalities to prevent and prohibit the pollution of the Upper Holland and its tributary streams. p. 36

23. That the Authority watch to see that no large-scale dumping of industrial waste in the sandy areas in the east and south of the watershed, which are the principal intake areas for the artesian aquifers, is permitted. p. 36

Wildlife

24. That the Authority recommend the immediate enlargement of the Aurora sewage treatment plant so that it can treat the present volume of wastes with the maximum efficiency. p. 9

25. That the Authority apply to the Pollution Control Board of Ontario to have the problem of pollution at Newmarket given immediate attention. p. 8

26. That the Authority urge the establishment of proper settling beds for tannery wastes at Holland Landing, and the use of Polycide for the control of odours. p. 11

27. That the Authority urge landowners to construct trout ponds, of the types specified, on the larger tributaries; to install low dams and deflectors in the remaining trout water; and to plant alders for shade and fragile willow (*Salix fragilis*) for bank control. p. 13

28. That the Authority see that the introduction of fish in the watershed is restricted to those streams which are shown by the survey to be suitable habitat for the species concerned. p. 13

HISTORY

CHAPTER 1

EARLY ROUTES OF COMMUNICATION

1. The Name of the River

The river now called the Holland must have borne many different names given it by the successive inhabitants of the area, but it is hard to say what they were. Though many of the maps drawn before 1760 show the river and some show two main branches, it appears that none give its name, so that the name used by the Hurons and Iroquois is uncertain. In 1730 when the Chippewas had been in control of the region for more than thirty years it was apparently called the River "Escoyondy". Fifty years later the Mississaugas called it something like "Miciaguean". Both versions are found in 1793, though as always there are a number of different spellings. In that year it became "Holland's River", in honour of Major Samuel Holland, Surveyor-General of Canada.

This name (which was soon shortened to Holland) applied to what is now officially called the "Schomberg River" as well as to the lower reaches below the forks. This was until comparatively recently regarded as the main stream, and what is now marked on maps as the Holland was called the East Branch. The new name of the south-west or centre branch has not yet been entirely accepted locally (except perhaps in the vicinity of Schomberg) and in recounting the early history of the watershed it will be usually more convenient to employ the names familiar to the early settlers and used by all the authorities quoted.

2. The Don and Rouge Trails

Until a little less than a hundred years ago the importance of the Holland River in the history of Upper Canada was due to the fact that it formed part of a line of communication between Lake Ontario and Lake Huron. By providing a waterway for a few miles southward from Lake Simcoe, it made easier

the short route from Huronia to Niagara, the Grand River and the south-west, and by Cataraqui and Oswego to the St. Lawrence and the Hudson. For travellers who were not alarmed by a journey of about thirty miles overland and were not in fear of hostile tribes, this was the quickest and in some respects the easiest route. As a result the trails leading to the Holland were frequented by the first inhabitants of the area and by the tribes who followed them both before and after 1615.

These were followed in turn by French, Dutch and British, by explorers and traders, by saints, soldiers and sailors, by royal governors and pedlars, by settlers seeking homes and tourists seeking pleasure. The development of the area was profoundly influenced by this traffic and this influence did not cease altogether when the railway was built just a century ago.

There were three principal trails from Lake Ontario to the Holland, starting from near the mouths of three rivers. It will be convenient to refer to these by the present names of these streams, though only that of the Rouge dates from before 1794 and both this river and the Humber had other names in the first years of settlement. The trail from the River Rouge, starting to the east of the "Highlands" in Scarborough, was, until 1678, as frequented as the Humber Trail and continued to be used by the Indians after the latter had become the established route for most white men. Though a little the longer of the two, this portage led over easier country, and for travellers intending to coast eastwards along the north shore it had the advantage of shortening the dangerous lake navigation, making it unnecessary to round both the peninsula (Toronto Island) and the Scarborough Bluffs, which once extended much farther into the Lake. Travellers to and from Niagara or the Head of the Lake would find the Humber Trail more convenient for the same reasons.

The Don Trail, which, like the Rouge portage, led to the east branch of the Holland, had some disadvantages and was probably less used by the Indians, though when the region was comparatively thickly peopled it must have had more importance. Few of the many sites where Indian remains have been found along this trail have been investigated with enough care to establish whether or not they were occupied in prehistoric times. Some undoubtedly were, but almost all are now out of reach of the archaeologist. Some sites along the Rouge Trail could still be excavated and might yield as interesting results as the recent excavation at the "Old Fort".

This proved to have been a village site, abandoned before the inhabitants had come under French influence. The name "Old Fort" was given to it before 1860 and suggests that something resembling an earthwork or the traces of a palisade was then visible. No earthwork can now be traced and the excavations revealed no trace of a palisade. The site occupies a strong position near the front of Lot 15, Concession VI in Whitchurch Township. The hill slopes steeply to swampy ground on the south and west; the approach from the east is broken by an old gully and the East Holland flows a short distance to the north. This was a village of some importance not long before the French explorers appeared in the region. It probably had some connection with one branch of the Rouge Trail which may have crossed the morainic ridges a little to the west, where for a short distance the summits are lower than on either side.

When Champlain reached Lake Simcoe in 1615, the whole region south of the lake had long fallen under the shadow of the Iroquois. Unable as yet to occupy it themselves, they were able to deny it to any other nation and it seems already to have been avoided by the Hurons. Except when travelling in large war bands, such as the one Champlain rashly accompanied

into Iroquois territory, they used the long, dangerous Ottawa route to reach the St. Lawrence. They were, however, not entirely excluded from the Toronto Carrying Places. Etienne Brulé, carrying a message to the Andastes from Champlain, then camped near the site of Orillia, is generally believed to have travelled by the Holland and Humber. If so, he was the first white man to have seen the waters of the Upper Holland, though it is not likely that he ascended that branch.

It is just possible that some adventurous Frenchman may have gone with Indian bands over the Rouge Trail between 1615 and 1630. This route was probably safer for small parties than the Trent, which was the favoured war path for Iroquois raids on Huronia. As the attitude of the Iroquois to the French gradually hardened, both Hurons and Frenchmen were entirely excluded from Lake Ontario. In 1635 Father Brébœuf speaks of the route as "unfrequented" and Father Lalemant six years later implies that it was impossible to use it to Montreal.

Within a few years the Iroquois had decided to destroy the Hurons and Neutrals and, if possible, close the Ottawa route. By doing so they hoped to monopolize the fur trade of the west and provide themselves with fresh hunting grounds. These were now becoming essential. Their trade with the Dutch at Albany had given beaver pelts a new value and they were rapidly reducing the number of beaver to the south of Lake Ontario. They had carried out the first part of this plan by 1651 and were then supreme in almost all the territory south of Lake Huron. The destruction of the beaver continued until few were found south of Lake Ontario. The Iroquois began to found villages on the north shore and at some inland points. The French do not record any village on the Holland as they do at "Ganatsekwyagon" near the mouth of the Rouge. There may have been some inhabited places near the river, though perhaps these were rather permanent camping places than fortified villages.

During the years when the French were excluded from the Toronto Portage, there was nothing to prevent the Dutch from using it. They became thoroughly familiar with this route and later passed on their information to the English when New York became a British Colony. By that time an uneasy peace had been established between the French and Iroquois and it was possible for the former to ascend the St. Lawrence. It was now the Rouge Trail that attracted the attention of the explorers and usually appears on their maps. Most of these give few details that are of help in determining the course of the trail. Two maps, of about 1674, attributed to Joliet, give more information. They show that this trail began a little way up the river, where it was flowing from the north-west or west, and led off nearly at right angles to the valley. Raffeix's Map of 1688 has the rivers drawn on a far larger scale than the rest of the map and gives some interesting details, probably intended as a guide to travellers. It shows the forks of both the Holland and the Humber, but unfortunately not those of the Rouge. The bend in the river is clearly shown and the beginning of the trail some distance above the village of Ganatsekiagon. The trail is shown ending on the East Branch of the Holland some distance above a sharp bend to the west. Allowing that the river is wildly over-scaled, this agrees well enough with the later termination below the first lock, though at first sight it suggests a point near the site of Newmarket. That the trail ended as high up as this latter point is possible but unlikely, for, as a rule, the Indians preferred to carry straight from slack water to slack water, avoiding even the first rapid. But, like the Humber Trail, the Rouge route had probably more than one starting point and termination.

Raffeix gives the length of the trail as "15 lieues" or leagues. If the league is taken at its later length of about 2½ miles, this is far too long for the distance from one river to the other. It is closer to the distance from

one lake to the other. But apart from the difficulty of estimating distance in bush country, the length of the "computed league" varied as widely in seventeenth and eighteenth century Europe as the "computed mile" in different parts of England at the same period. Raffeix's estimate is much closer than Gallinée's of "20 or 22 lieus" (20 to 22 leagues). A description of 1730 says:

> "It is 15 leagues from Quinte (Carrying Place) to the River Camestiagon. At the mouth of the said river there used to be an Iroquois village; after them the Mississaugues; the said river is navigable for 2 leagues; at the end there is a portage of 12 leagues through good country of low hills. The route is northerly and at the end of 12 leagues is the River Escoyondy. The said river runs northeast about 10 leagues and falls into Lake Toronteau ..."

This has been accepted as referring to the Rouge Trail. The description of the portage is accurate and the length not far out for a carry to Holland Landing from a point five miles by river up the Rouge; but the distance given from Quinte suggests that the writer was confusing Ganatsekiagon with Ganaraské (Port Hope) and his information about the Holland was vague.

This description shows that the trail continued to be used in the eighteenth century and it is shown on later maps. From the introduction of sailing vessels into Lake Ontario in 1678 the French preferred to use the Humber Trail because it had better anchorages near it. The founding of posts at Niagara in 1720, at Toronto in 1729 and again in 1750-1 confirmed this preference even for the Indians.

After the capture of Fort Niagara by the British in 1759 and the consequent burning of Fort Rouillé (Toronto) by its French garrison, there are few references to the Rouge Trail. The river now called the Don is shown on Raffeix's map of 1680. This may indicate that the French already had some knowledge of a route by this river. But no mention of it has been found before 1793 and Governor Simcoe says that this trail was then known only to a few hunters. The Mississaugas were, however,

still using a camping ground east of the pond or lagoon later called "Soldier's Bay" and now "Anchor Bay Park". From this pond they were in the habit of carrying their canoes for about $1\frac{1}{4}$ miles to the "Upper Landing" and then, presumably, paddling upstream to the first rapid. This will have been a little east of the bridge on Yonge Street at Holland Landing.

A trail from the camping ground at Soldier's Bay crossed the Holland at this shallow and then struck south-east crossing the line of Yonge Street at Lot 87, three-quarters of a mile south of Armitage. For five miles, to Lot 67 a little north of Oak Ridges, the trail ran east of Yonge Street, usually between it and the later railway line and seldom more than half-a-mile from the street. After crossing the line of the street at Lot 67, the trail ran at greater distances to one side or the other of the line, crossing it twice before reaching the line of Eglinton Avenue east of Avenue Road. There it seems to have split into two branches. One led south-east direct to the fords of the Don near Pottery Road, where the main trail from Cataraqui to Niagara and Detroit crossed that river. The other continued south to the same path close to the intersection of Davenport and Poplar Plains Road, and on to the camping ground on the shore of Toronto Harbour.

The Mississaugas were probably using the Rouge Trail after 1793 and it has been said that some of Berczy's Germans reached Markham by this route, but this does not seem to be the case with the main body of Germans at any rate. Nor has any confirmation yet been found for the more definite and probable statement that Berczy examined the Rouge after 1794 and made a proposal to improve its navigation. After the opening of Yonge Street the Rouge and Humber Trails soon ceased to be used and were forgotten, but parts of the Don Trail continued to be used for many years as settlers' roads.

Looking north-west from the "Old Fort" on Lots 14 and 15, Con. VI, Whitchurch Township, towards the East Branch of the Holland River (middle distance) and Lake Simcoe. It seems probable that one branch of the Rouge Trail crossed the lower part of the morainic ridges south-west of this point.

The East Branch at the Upper Landing on Lot 111 West. Loaded boats could reach this landing in 1811. The first steamboat on Lake Simcoe is said to have been built here and towed down to the Steamboat Landing.

The East Branch of the Holland River, looking downstream to the Lower Landing near the boathouse in the centre background. Until 1851 the steamers unloaded at this landing. The entrance to Soldiers' Bay is outside the picture to the right.

3. The Opening of Yonge Street 1794-1814

One of the chief purposes of the founding of York was to open a communication to the Georgian Bay by way of Lake Simcoe. The scheme had been talked of since 1784, but did not take definite shape until Simcoe had begun to build the town nine years later. The original scheme was to make this communication a straight road, with townships fronting on it to east and west, running from some point on the Humber Trail to the Holland River. On September 24, 1793, Governor Simcoe set out with packhorses from the mouth of the Humber and, travelling at his usual slow rate, reached the end of the packhorse route near the Sixth Concession of King Township at about 6 p.m. on the 27th. The next morning he had to wait while two of the party went up river to bring the canoes which had been taken to the end of the old footpath above the marshes. The party had now to wade through a stretch of marsh before they could use their canoes and this experience, by turning Simcoe against the Humber Trail, was decisive in assuring the early settlement of the Upper Holland.

At their next camp, a short distance up the North Branch of the Holland, the Governor was visisted by a chief called Great Sail, from whom he learnt of an easterly route from Lake Simcoe to Toronto. Simcoe appears to have determined to try this route on the return journey. After completing their trip down the Severn River to Matchedash Bay and returning the way they had come, they reached the Holland on October 11. Ascending the river they turned "into another river, and about two o'clock got to the landing place at the red pine fort". This landing place was either Soldier's Bay or the Upper Landing, probably the latter to judge by the map of the expedition; but the "red pine fort" is more mysterious. If the name referred to an existing building or to the memory of a French post, this was the first habitation built in the watershed by white men.

It does not appear on any map and the only contemporary reference to it that has been found is the one just quoted from the diary of Alexander MacDonnell.

Simcoe's determination to follow a new path was now placing the expedition in difficulties. They were short of provisions and John Vincall, one of the Queen's Rangers, had cut a toe "almost off" on the 2nd and was still too lame to walk any distance. He was left with Messrs. MacDonnell and Givens and the latter's servant McEwen to subsist on a meagre portion of the supplies until a horse could be sent for them to the end of the Humber Bridle Path. The Governor, his staff, Alexander Aitken's survey party and a few Indians set out after dinner to find their way to Toronto Bay.

Heavy rain came on and they camped "on the bank of the East Branch of Holland's River in a cedar swamp". If they followed the custom established by Simcoe on his journey to Detroit and sang "God Save the King" before sleeping, it was possibly the first time the National Anthem was heard in Holland Landing, for they were probably within the limits of the later village.

After setting out on the 12th the party lost the path several times before breakfasting on the East Branch about a mile south of Armitage. By this time they were back on the trail that settlers were soon to convert into a wagon road, and in the afternoon they crossed the divide and camped on the East Branch of the Humber. The Governor and his staff seem to have believed that they were still lost on the 13th, when they had only one day's ration left. But Alexander Aitken, whose diary is the best source for this part of the journey, does not mention again losing the path and seems to have been in no doubt as to where they were. Aitken may have allowed them to believe they were dependent on the Governor's compass until they came on a surveyor's line at the Fourth Concession from the Bay (Eglinton Avenue). The last provisions had been eaten for

"breakfast" about $1\frac{1}{2}$ miles up the trail. They caught a glimpse of Lake Ontario before reaching the Fourth Concession, when the suite were already threatening to eat Jack Snap, the Governor's big dog, but it does not appear that he was really in much danger of being sacrificed. The party reached the "camp" on Garrison Creek opposite Old Fort York before 3 p.m. on October 14 - exactly three days from Holland Landing.

The new route seemed to suit Simcoe's purpose exactly. On October 19 he wrote to Dundas that he had "ascertained by a Route hitherto unknown but to some Indian Hunters, that there is an easy Portage between York and the Waters which fall into Lake Huron of not more than thirty miles in extent, and through a Country perfectly calculated for agricultural Purposes". He proposed to have it surveyed in the spring and hoped to "compleat the Military Street or Road the ensuing Autumn".

Simcoe was impatient to begin and it was hardly yet spring when Augustus Jones set out in February 1797 to run a straight line from the East Branch of the Holland to the Fourth Concession from the Bay in York Township. He had with him a small detail of the Queen's Rangers and some Indians. The line was to run from the stake between Lots 20 and 21 in the Fourth Concession from the Bay to the Indian Landing Place on the East Branch of the Holland. Which landing place was intended is not clear. The 1800 survey of Gwillimbury East shows "Landing Place" at the north-west corner of Lot 111 West, with the river running just west of Yonge Street. This notation is repeated on a plan of the town of Gwillimbury, made at about the same date with the statement that "It is reported that <u>loaded boats</u> can pass from hence into Lake Simcoe distance by water about 8 miles". Another "Landing Place" is marked at the pond at Soldier's Bay with the note that canoes could pass down the pond and river to the lake. Between the two is written "The Indians it is said carry across this neck". This seems to imply

a third landing for canoes higher up the river at the first shoal. A fourth appears on a new townplot made in 1811, on Lot 118, East of Yonge Street, near the steamboat landing of the 1830's and 1840's.

Simcoe's "Landing Place" seems to have been the boat landing on Lot 111 and Jones began his line at this lot. The direction he took brought him to Eglinton Avenue 15 chains or 330 yards to the east of the road allowance between Lot 21 and Lots 16 to 20, Concession III from the Bay. The double turn that this caused was not altered for more than forty years.

The new military road was given the name of the then Secretary for war, Sir George Yonge. At the beginning of May a large party of Queen's Rangers was sent to cut a track while other Rangers helped Alexander Aitken to lay off the lots. When the rangers were suddenly ordered to Niagara on military duty on August 15, 1794, the road had been cut beyond Thornhill. This cutting produced little more than a narrow sleigh track with logs laid across the worst swamps. It was still impassable for wagons. In September William Berczy agreed to make a wagon road to Holland Landing in return for a free grant of four desirable lots on Yonge Street which had been reserved to pay the soldiers who were to open the road. Although Berczy was exceedingly busy starting his settlement in Markham, he had improved and bridged the road as far as Langstaff by the end of November 1794, so that loaded wagons could pass over it. Sickness now broke out among his workmen and for this and other reasons he was unable to complete his contract.

Nothing more was done except by settlers, until the war scare was over and the Rangers again available. In January and February 1796 Augustus Jones with thirty Rangers completed the "opening" of the road to the Landing. This was not a wagon road such as Berczy's but a sleigh track with some bridging of streams and causewaying of swamps. In the watershed

the settlers preferred to use the rough track they had made from the old trail where it ran east of the road through Lots 67 to 87.

In 1796 the clearing of half the road allowance became part of the duty of settlers along Yonge Street and this was extended to include "making" half the road, that is, cutting the stumps low enough for a wagon to pass over and burning all logs and brush. Little attempt was made to enforce this until after 1798, but grantees in September and October 1799 were given only until Christmas to "make the road". Inspection in 1801 showed that many were still dilatory and the road hardly passable in places. There had been some improvement and the enforcement of road duties became steadily stricter. In 1803 a bill was introduced in the Legislative Assembly to make this possible, but it was not passed until the following year after a petition had been received from about 55 freeholders on Yonge Street.

The upkeep of such a highway was beyond the means of settlers. Certain roads were declared "Public Highways" and another Act passed to allow provincial funds to be applied to improving them. Dundas Street was improved under this Act, but not very much had been spent on Yonge Street before it was repealed as unsatisfactory in 1806. New Acts for this purpose were introduced every year until 1812 and under them something seems to have been accomplished. On December 9, 1808, the York Gazette reminded its "Yonge Street friends" that a general election was due in 1809 and that this was "the proper time to petition for a turnpike, for the obvious reason that the present House of Assembly will be proud by supporting such a beneficial and praiseworthy measure to leave a great and laudable example to their successors for emulation".

In England a "turnpike" meant a toll road operated by a road company, but the editor probably had in mind only a grant for "turnpiking", which in Upper Canada meant crowning

up the road from the sides with a plough, the outer furrows forming ditches. Usually when a road was turnpiked the wet patches were corduroyed and most of the stumps and large boulders removed. This seems to have been done on Yonge Street in the next few years and when war broke out in 1812 there was something better than a bush trail from York to the Landing.

The heavy traffic of the war years soon reduced all roads to an appalling state and partial repairs were needed in a short time. In 1814 a much larger sum was voted for the highways and the Commissioners appointed under earlier Acts were called on to examine the roads for which they were responsible. The repairs carried out under this act resulted in a great improvement. In 1816 an intelligent traveller thought Yonge Street the best road he had seen above Montreal. This implies only that it was a fairly good dirt road in dry summer weather. It was still impassable in some seasons and always dangerously rough, but a great advance had been made since 1794.

CHAPTER 2

THE PIONEERS

1. Settlement: 1794-1815

The settlement of the watershed began soon after the granting of the first lots on Yonge Street. Applications had been received before the lots were all laid off. The first settler was probably living just south of Thornhill, when the Surveyor-General issued a notice on July 15, 1794, to all persons who had received assignments for lots on Dundas Street and Yonge Street that unless a house was built on their lots and occupied within one year they would forfeit their grants.*

The terms of settlement duties up to that time had been the vague ones in use before 1792. The settler had been required to "settle and improve" his holding. In practice this was interpreted as fulfilled by building some kind of cabin and making a small clearing. The settler was expected to do his share of road work when called on, but it was not definitely stipulated that he must clear half the road allowance in front of his lot. Even these requirements were not strictly enforced in the case of additional lands in the back concessions.

The announcement with regard to the military roads was a sign of the Government's intention to enforce actual settlement along them. From the first the definition of a "house" on Yonge Street was taken to mean something better than a "hut" with a lean-to roof (later called a shanty) or a little cabin covered with bark. A real effort was made to see that the grantees on the street were in a position to build a proper house and to find a tenant if they themselves lived in York or elsewhere in the Province. Settlers from the United States or Lower Canada could not have their grants confirmed until they became residents in Upper Canada and settlers who left the country were liable to forfeiture.

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* Ontario Department of Lands and Forests; Survey Records, Letters Written No. 2, page 428.

The first grants were distributed in groups a few miles apart, for though the settlers were allowed some choice it was the policy of the Governor to provide houses at intervals for the convenience of travellers. In August 1794 the northernmost dwelling was William Bond's "common Log House" on Lot 64, where he already had installed his farmer. Bond was planning to form a considerable settlement on the Ridges, though he had been somewhat discouraged when some Mississaugas robbed his farmer "even to the shirt on his back". The first actual settlers on the Upper Holland Watershed evidently wished to join this group if they could not obtain land near one of the groups farther down the street.*

On August 2, 1794, Captain William Graham, a "reduced" Captain of the Duke of Cumberland's Provincial Regiment serving as Captain-Lieutenant in the Queen's Rangers, applied for a tract of land for himself and two men whom he calls his "servants". They had all three served in Loyalist Corps during the Revolutionary War and had come to Upper Canada from Nova Scotia. Graham was at that moment engaged in some public work of importance which seems to have kept him in York when the Rangers were ordered to Niagara. He was evidently considered to have some knowledge of building and one of his servants, Charles Fathers, was a mason. The other, Frederick Smith, seems to have been a farmer, and it was he who became the first resident settler in the watershed.†

Graham was prevented from going to Niagara to push his petition until November 1794 and by then the lots he had indicated were all granted. He now asked by letter to the

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* William Bond to D. W. Smith, August 27, 1794 - Lands and Forests, Survey Records, Letters Received No. 2, pp. 562-563. Bond says that his "Farmers" were living in this house and that he meant to build "a good Country House on each" of his lots and open a tavern on one of these. For the robbery see Simcoe Papers, Vol. III, page 24 - Wm. Chewett to E. B. Littlehales, August 31, 1794. It must have occurred at about the time Bond was writing to Smith.

† Lands and Forests, Survey Records; Letters Received No. 2, page 525,& No. 3, pages 708-9 & 740-1.

Surveyor-General for Lots 77, 78 and 79 on the east side of Yonge Street and was given 79 for Fathers, 78 for Smith and 77 for himself. Later he was granted Lot 76 on condition of building a mill on it. As only half-a-dozen people were ever granted two lots on Yonge Street, Graham must have impressed the authorities as a suitable settler and a possible future magistrate.

Frederick Smith seems to have gone to his lot not later than February 7, 1795, and by the following August he had built a house and made a clearing. He probably superintended the improvements on Graham's lots and possibly on Fathers' also. Both had made small clearings and cut logs for houses. Several other grants had been made north of Lot 65, some possibly before those of Graham and his men, and four of the grantees on the west side had built houses. All of them were absentees, who had little or no intention of becoming residents on Yonge Street, and they seem to have made no effort to find tenants. On the east side, James Pitney on Lot 66 had made an improvement and prepared to build a house. He may have been living at Bond Lake, for he was one of the hatters who were to work in William Bond's proposed hat factory. When this scheme fell through he moved to York.

The Authorities were still trying to be strict in enforcing occupancy. In 1795 they refused to confirm the grants of even such influential absentees as William Jarvis until they could show that their farms were let to tenants. In 1796 the size of the house to be built on Yonge Street was set at 20 feet by 16 feet "in the clear". It was probably expected to have a loft or attic and houses "covered with bark" were being rejected. But the Land Board was not always consistent. There was some relaxation of pressure after Governor Simcoe went on leave in 1796. Early in 1797, patents were issued for all but one of the five grants in King Township between Lot 66 and Lot 82, although an inspection

in August showed no occupants and no additional improvements. On the east side Frederick Smith, Charles Fathers and James Pitney received patents, although the two last were "at York" and were letting their little clearings run to brush. Captain Graham had two hands on his lot and both he and Smith had enlarged their clearings and by the following year both had houses which met the requirements.

The inspection of June 1798 showed some increase in residents on the street as a whole and added one more actual settler within the watershed - Henry Harman on 77 West. The majority of the houses were, like Harman's, smaller than the minimum size, the clearings less than the required five acres, and nothing is said of any clearing of half the road allowance, which now formed part of the settlement duty. There may have been two other families resident, for two small log houses are reported on Lots 81 and 82 East. Only one of these lots had been granted, so that one or both of these families will have been squatters.*

Unless there were other squatters farther north, these three to five households were the only ones in the watershed in the summer of 1798. Two new developments were now to affect settlement in this area. The first of these was the coming of the French Royalists. The proposal to settle a group of refugees in Upper Canada had been made some four or five years before, but now it was announced that a party was on its way and that other parties might be expected to follow. In the face of some reluctance on the part of the Executive Council it was decided to place these veterans of the army of La Vendée on Yonge Street as a military settlement.† On October 22, 1798, when the party had already left Montreal for Kingston, a list

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* For Augustus Jones' Reports of August 1797 and June 1798 see Lands and Forests, Survey Records; Letters Received No. 6, pages 1904-6, and No. 8, pages 250-3.

† The Royalist rising in La Vendée, a district of Brittany, had been supported by a British expeditionary force.

was prepared of all grants on Yonge Street, showing which lots were vacant or could be thrown open for non-compliance with settlement duties. Since most of the vacant lots were north of the Ridges, it was proposed to reserve the front of King and the whole of Whitchurch for the French and even to throw open some unoccupied lots for which patents had been issued.

In the end it was not found practicable to revoke patents and since all the first party of French were placed in Vaughan and Markham Townships, the reserve on Whitchurch was not required. It was not rescinded until October 1799, but a number of locations had by then been made on this part of Yonge Street. However, by focussing attention on the condition of Yonge Street beyond the Ridges, the affair of the French Loyalists helped to hasten both the settlement and the improvement of the road. The Government now began to direct settlers to the area and to press for the completion of road work, stressing this even more than house-building.

The second development to affect this area was the decision of some fur-traders in Montreal to use this route. They are said to have begun to draw their goods and boats up Yonge Street with oxen in 1798. Such activity would be bound to increase the demand for lots and the drastic reduction in the fees charged for deeds would also have its effect. The grants made in 1799 still include some absentees and some York tradesmen, who, as Captain Graham said, would never make farmers. They also included some whose names were to be well known in the neighbourhood a century later, such as the two Codys and Isaac Phillips in King above Aurora and Stephen Barbaree, who became one of the first constables of Whitchurch.

These men belonged to a type which had been coming to Canada since 1794, but were now arriving in much greater numbers. They came chiefly from the old Middle Colonies; in most cases from Pennsylvania, and though many were poor men, with little more than they could carry on their backs, others had been in easier circumstances, and brought with them

the stock of their established farms and their household goods piled on wagons. In 1800 the Gazette reported the departure of a large number of wagons from Pennsylvania heading for Upper Canana, and some of these may have been Quakers bound for Whitchurch, King or Gwillimbury.

These settlers were now being more warmly welcomed than they had been from 1796 to 1799. Governor Simcoe had been inclined to look on all of them as "passive Loyalists", returning to their allegiance; but the President and Council of the interregnum, active Loyalists almost to a man, had viewed them with more suspicion. Governor Hunter was probably under no illusion as to their loyalty in the past, but he realized that they were peaceful law-abiding people, alarmed at the apparent anarchy prevailing in the new republic. They chose to seek cheap lands in Canada rather than in the Territories, because there they believed that they would be free from the threat of Indian wars and rebellions, from land speculators and disputes over State boundaries.

For these reasons they included groups of Mennonites, Tunkers and Quakers, all of whom rejected violence for reasons of conscience. It was the Quakers who were to be the chief settlers in Whitchurch and the adjoining parts of King and Gwillimbury, though some Mennonites also entered these townships. From October 5, 1799, when the Chief Justice asked for a list of vacant lots and located three settlers in King south of Aurora,* to mid-summer 1801, when John Stegman reported on settlement duties,† a steady stream of such settlers was entering the area. They included the two Nathaniel Gambles, father and son, at whose house the township meetings were held for many years, and Timothy Rogers, regarded as the leader of the

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* Lands and Forests, Survey Records; Letters Received No. 9 page 669. For further correspondence re. grants in this area see ibid. No. 9, pages 543, 668, 670 and 701-2.

† Lands and Forests, Survey Records; Surveyors' Letters - Stegman, pages 243-262.

Quakers, on Lot 95 East and six other Rogers on the lots in King from 90 to 96. Timothy Rogers had bought several improved lots south of his grant and other families, like the Armitages, also bought improved farms. By August 1801 almost every lot from 76 to 96 inclusive on both sides of the street had improvements, usually with an occupied house. South of 76 there seems to have been only one resident before Bond Lake and the absentees were neglecting their duties. North of Lot 95, in Gwillimbury, were more "followers of Timothy Rogers" who had arrived after August 1800 and so could not be expected to have completed their duties.

The lots on Yonge Street could not accommodate all the Quakers and it was in 1800 that settlement really began in the back concessions. Augustus Jones had surveyed the second and half of the third concessions in Whitchurch and a corresponding area in King in 1797. A number of grants had been made about that time and some patents were issued, but in every case these were additional lands granted to absentees, who made no effort to improve them. There is no evidence of the presence of squatters or tenants before 1800.

In 1800 John Stegman completed the survey of King and carried that of Whitchurch to the Fifth Concession. He finished the township in 1801, being paid with a block of lots. Some lands had already been assigned to absentees in these concessions, but enough lots seem to have been kept open or forfeited to allow the Quaker settlement to spread eastwards to Pleasantville and Pine Orchard before 1805. Stegman located a group on the south Townline in 1801, which included some families, such as the Randalls and Pearsons, who later moved north into the watershed and some of these were Pennsylvania Quakers. Settlers of other origins also came into the watershed from this direction, including some Germans from Markham.

These concessions had their full complement of Crown and Clergy Reserves, amounting to two-sevenths of the lots, and in the Sixth, Seventh and Eighth Concessions of Whitchurch

there were large blocks of reserves to make up those omitted on Yonge Street. These extra reserves blocked settlement north of Musselman's Lake in Concession VIII, south of Ballantrae in Concession VII and at the headwaters of the Vandorf Branch in Concession VI. None of these Clergy Reserves had been rented before 1812, but some of those farther east were leased in 1802-8, a sign of the keen demand for land in the area. At about the same time a number of absentees in Whitchurch began to take out their patents, probably as a preliminary to selling some land to settlers. The way was thus opened for some settlement around Bogartown, where John Bogart rented Clergy Reserve Lot 30, Concession II, in 1802, and around Vandorf and Wesley Corners, where there were a few vacant lots in Concessions III and IV. Other Owners, like Captain Graham, who retained most of his 2,000 acres in Concessions II and III, were now in a better position to find tenants,

The same process was going on more slowly in Concessions II and III of King and Gwillimbury East. Gwillimbury was entirely vacant in 1798 except for a grant of one lot at the Upper Landing. Some of the Quakers on Yonge Street took additional lands in this section and there are not likely to have been many residents before 1805. In King almost all the unreserved lots in the Second Concession up to 29 had been granted to absentees, several of them women, and those above were mostly taken up by settlers along Yonge Street. Actual settlement in this section was slow before 1814. Only one Clergy Lot in King Township had been let by 1812. Only 33 families, totalling 160 souls, were returned for the whole of King Township in 1809. A table prepared in March of that year and found among the papers of Thomas Ridout,* Acting Surveyor-General, gives different figures for King Township. These probably represent corrections not entered in the Township records. As the table includes all the Home District it will

* Edgar, M., "Ten Years in Upper Canada" (Ridout Papers), 1890, page 27.

be of interest to extract the figures for those townships in the watershed with some adjoining townships for comparison.

"NUMBER OF INHABITANTS RETURNED BY THE TOWN CLERKS OF THE HOME DISTRICT, PROVINCE OF UPPER CANADA, TAKEN IN MARCH 1809:"

Township	Men	Women	Males under 16 years	Females under 16 years	Total
Town of York	195	162	137	83	577
Township of York	175	126	167	150	618
Scarborough	34	24	44	38	140
Etobicoke	32	27	34	44	137
Pickering	40	35	51	54	180
Markham	294	234	320	263	1,111
Vaughan	75	60	99	99	333
Whitchurch and Uxbridge	123	127	258	218	726
East Gwillimbury	79	69	149	128	425
West Gwillimbury	13	12	29	20	74
North Gwillimbury	16	15	18	24	73
King	45	30	58	42	175

(Toronto, Trafalgar, Nelson, two Flamboroughs, Beverly and Waterloo Townships - Total 1,224 - Average 175)

Totals for Home District

Number in 1809	1,501	1,228	1,852	1,590	6,171
Number in 1805	1,080	870	985	849	3,784
Increase	421	358	867	741	2,387

The table well illustrates the comparatively rapid settlement that had gone on since 1799. Uxbridge Township remained sparsely settled until after 1850, so that it may be assumed that at least 70 per cent of the families listed were living in the eastern half of Whitchurch, most of them within the watershed. This was true also of the surprisingly large settlement in Gwillimbury East. The movement of the Children of Peace or "Davidites" to Sharon can as yet have had only a moderate effect on this township. In Gwillimbury East the thirteen heads of households exactly correspond to the number of patentees on the west side of Yonge Street, then part of that township. Almost all the families in King were living close to Yonge Street. The difference between the 33 heads of

families returned at the King Town Meeting and the 45 adult males reported to Ridout, is probably chiefly composed of "farm servants" and unmarried squatters returned later, but 3 children under 16 years appear to have been added to the list.

There was a very slight increase in the numbers reported at Town Meetings in King in the next two years, due possibly to more correct listing as well as to new arrivals. After the outbreak of war some settlers seem to have left King Township and the numbers returned are lower for a few years. The minutes of early Town Meetings in the other townships have not survived or at least contain no figures of population. It is likely that the numbers in Whitchurch increased slowly and that some settlers abandoned their farms in Gwillimbury West. The growing numbers of the Davidites would cause some increase in Gwillimbury East.

It was a small and isolated community that was visited by Nathan Bangs, the Methodist missionary, in 1804. He found the Quakers friendly, hospitable and religious. They welcomed him to their meetings and heard his preaching with pleasure. But since they refused to adopt the Methodist church organization and system of worship, he wrote them down as stubborn and ignorant. He also thought them poor and rather backward, not realizing, perhaps, how recently they had come to their lands.*

When Governor Gore followed Simcoe's example in 1807 by making a journey of inspection to Matchedash Bay, the settlement was already changing its character. In 1804 it was composed almost wholly of farmers, but it could not be long before the growing settlement and traffic brought men who were looking not for farms but for good locations for taverns, mills and merchants' stores. One of the first of these whose coming was of importance to the area, seems to have moved from York early in 1805.

Elisha Beman had come to Canada from the State of New York, arriving at York in 1795, where he began what were described much later as his "great and arduous exertions .....

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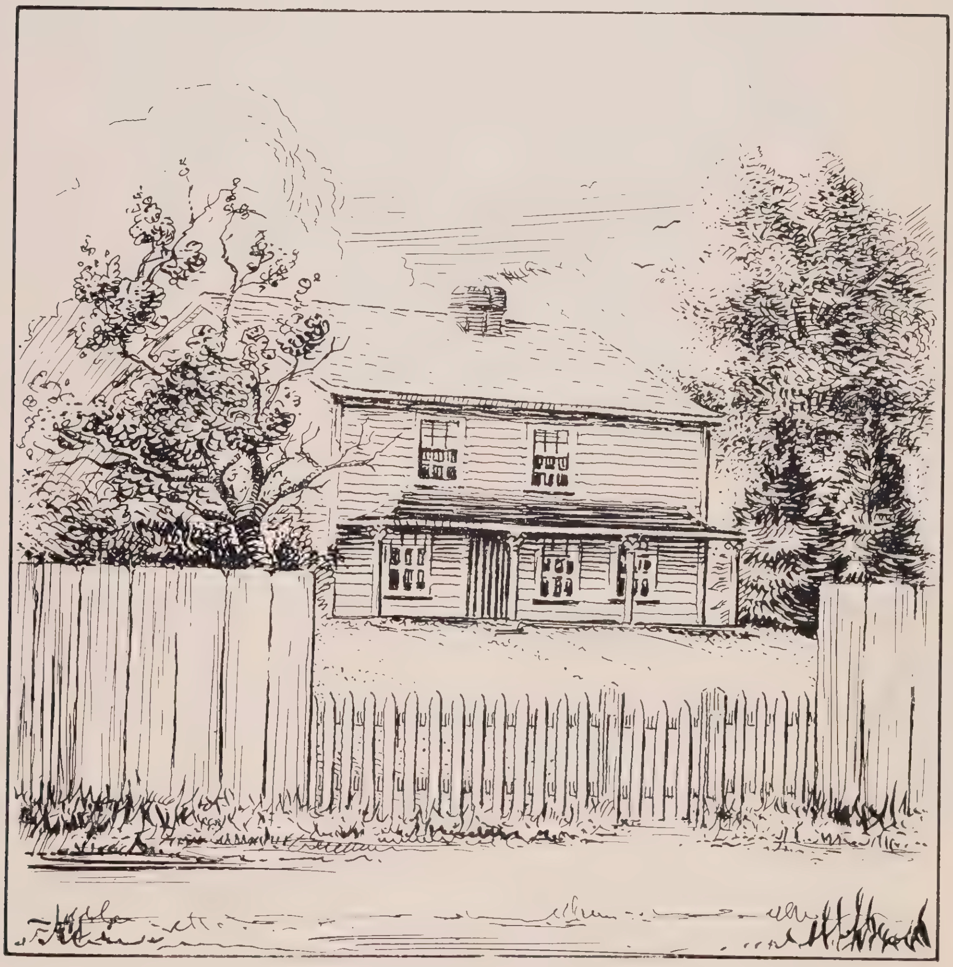
* Abel Stevens, "Life and Times of Nathan Bangs" (New York, 1863)

The centre of old Newmarket – looking north up Main Street from the site of the Beeman-Robinson house. In 1828 Borland & Roe's Store stood to the right, John Cawthra's on the site of the brick house on the left. This house seems to have been built around 1840 and "improved" about twenty-five years later.



Redrawn from a sketch in Robertson's Landmarks of Toronto.

The oldest house in Newmarket – the Beeman-Robinson house as it may have looked in 1825. This house much altered is still standing on Eagle Street.

...in providing provisions for the town". His thoughts soon began to turn to the country to the northward, and in 1797 he offered in a petition to the Land Board to settle either at the Landing or "on the Matchdash River"* with two labourers. He was willing to clear land and build buildings; provide beds, food and fodder for travellers; to let horses and operate a ferry on the Holland River and Lake Simcoe; to move his family there "as soon as they can be conveyed there in sleighs" and "to erect a Substantial Grist Mill & Saw Mill as soon as the progress of the neighbouring Settlements will admit". In return he asked only "One Thousand Acres of Land".

Beman's Petition was approved on April 13, 1799, and he was allowed to purchase 1,000 acres on the usual terms of sixpence Currency per acre plus the cost of survey. This brought his holdings to the 1,200-acres maximum granted to prominent settlers, often on much less arduous terms.

Before Beman could carry out his plans, family troubles put any move into the wilderness out of the question for a time. About this time his wife became seriously ill and his daughter Susannah may also have been ailing by 1800. Susannah Beman died on April 14, 1801, and was followed by her mother on August 31, "after a long illness". About thirteen months later Elisha Beman married Esther Sayre, widow of Christopher Robinson, Deputy Surveyor-General of Woods and Forests and a member of the Legislative Assembly.

This marriage enhanced Beman's position by bringing him into closer touch with the governing group, but it also increased his responsibilities. Christopher Robinson had died suddenly in November 1798, when the youngest of his five surviving children, William Benjamin, was less than one year old. The eldest, Peter, was then about thirteen. He was provided for two years later by being made Clerk of the Court of Requests, but the family had few resources, except two town lots in York,

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* The River Severn.

a recently "improved" farm of more than 200 acres on Ashbridge's Bay and claims as Loyalists to more than 3,000 acres of additional and family lands. In 1803 Mr. and Mrs. Beman were taking steps to settle their affairs in York, winding up Christopher Robinson's estate and placing John Beverly Robinson, the second son, at school in Kingston. Beman was evidently looking for a mill seat on the communication to Matchedash. On the last day of September, 1803, he negotiated a purchase of Lot 92 East from Simon McMertrie, a resident in York who had improved it and received his patent the previous year.

On the north-east corner of Lot 92 was the upper of the two mill seats marked by Stegman on his map of 1801. But this was so close to the lower mill seat on Lot 93 East (where the dam still stands in Newmarket) that a dam of any height on the latter would render it useless. Lot 93 had been improved and patented in 1802 by Joseph McMurtrie, a mason in York, and sold a few months later to Timothy Rogers. Rogers, who was himself a millwright, had permitted (and probably assisted) Joseph Hill to build a grist mill on this lot and this mill ground its first bushel of wheat before Christmas, 1801.

When Beman discovered that Hill's mill seat interfered with his own, he appears to have entered into negotiations with Hill to purchase his mill and house. Hill obtained legal possession of Lot 93 from Rogers early in 1804 and in October bought the whole of Lot 92 from Beman, giving in exchange the north half of Lot 93 and reserving the right to use water power from the east end of the dam.

It will have been at this time that Joseph Hill leased Crown Reserve Lot 33 in the Second Concession of Whitchurch. This adjoins Lot 93 to the east and was a good location for mills using power from the dam. It was most probably here that Hill started a small tannery and most likely a sawmill, for the two went together as a distillery did with a grist mill or store. Lot 33 also includes a mill site on Bogart's

Creek, and it was possibly Hill who first established a carding and fulling mill on the site of Eli Gorham's later woollen factory. A business card of the owners of this factory of 1878 bears the words "established 1809", and if these refer to the Newmarket mill, they imply a tradition that this woollen mill was set up during Hill's ownership of the lease. Eli Gorham is reported to have come to Newmarket "before 1812 and started a woollen mill soon after" his arrival. He must have sublet the mill site from Hill or Beman, for it remained Crown property until the lot was granted to King's College.*

Joseph Hill's ambitions were too large for his resources. He sold the lease of Lot 33, Con. II, to Elisha Beman, probably in 1811-12, and mortgaged his other property at Newmarket to Quetton St. George. This mortgage was foreclosed in 1812 and Peter Robinson, now a man of about twenty-seven, bought in the whole property at the Sheriff's sale. By these complicated transactions the Beman-Robinson family was by 1812 in control of most of the business then carried on in the hamlet that was to become the village of Newmarket. Their store, their first mills and probably their distillery were all in operation by 1805.

Elisha Beman may have moved to Whitchurch at the end of 1803, but it is more likely that he brought his family with the first sleighing at the end of the following year. He is not listed among the householders of York in March, 1805. A certificate sworn before him as justice of the peace in April is dated "Whitchurch". From that date he figures with Captain Graham of Whitchurch and Captain James Fulton of King as the active magistrates in this section of Yonge Street. Later in 1805 he applies for an innkeeper's licence, but for some reason this was not recommended. It is not known whether Beman ever

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* Elisha Beman says in his will that Lot 33 had been "leased to Joseph Hill and purchased by me". As no patent was issued before the one to King's College in 1828, this must refer to a purchase of the lease.

kept an inn or whether there was one at Newmarket before 1812.*

In 1814 Newmarket is said to have contained two frame houses and several log buildings. Most of these were probably standing in 1812. One of the frame houses was then occupied by Thomas Millard, miller for Peter Robinson. It stood near the river and was washed away by the flood of 1878. The other, occupied by Elisha Beman, was directly opposite Main Street on the south side of Water Street. This house was probably the older of the two and may have been built before 1810.† The presence of two frame houses makes it very probable that there was a sawmill at Newmarket, for frame buildings were rarely undertaken until sawn lumber was available. "Beman's Corners" now provided all the services then required by a farming community, but it did not owe all its importance to its mills. Elisha Beman was also trading with the Indians for furs and it is possible that other traders were using the post before 1814.

There was at least one other sawmill in the area besides the one at Newmarket. Wilmot's plan of the Gwillimbury Townplot of 1811 shows "Eves's Sawmill" on the site of the later "Red Mills" at Holland Landing. John Eves had patented Lot 108 East of Yonge Street in 1808 and had been constable of Gwillimbury Township.** There may have been some other sawmills, but these two would probably suffice for the demand, which must have been very limited. The settlers were evidently improving their

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* The only licence issued in Whitchurch in 1800-11 was to Nathaniel Gamble, who had settled near Amitage in 1800. Early Town Meetings were held at this house, which was probably kept by Nathaniel Gamble, Junior on his father's homestead, Lot 89 East of Yonge Street.

† It has been held that this was the house built by Joseph Hill in 1801 and sold by him to Beman in 1804. This is not impossible but as there is no mention of a sawmill in connection with Hill's original mill it seems more likely that Beman built the house after one had been set up. He may have used part of the loan that was subscribed by his friends in York to recoup him for the loss of his house and store there which were burnt in 1808.

** John Eves (or Eaves) later moved to the neighbourhood of Sharon.

houses with floors and partitions of sawn boards, but frame houses were not numerous in country districts in 1812 and it is not likely that there were any frame farm houses in the watershed.

2. The War of 1812-15

The war of 1812 did not touch the watershed directly, but had an even greater effect on its development than on other settled parts of the Province. The Quakers, Mennonites and Tunkers were excused from active service in the militia, but had to serve with their teams as transport or provide substitutes. The other inhabitants of the area of military age served in the York Militia or in the volunteer flank companies formed for active service in 1812. The rifle company raised and commanded by Peter Robinson was at the capture of Detroit and later did good service at Michilimakinac. A detachment of York Militia was at the Battle of Queenston Heights and remained on the Niagara Frontier until December, 1812, when they were recalled to York. The First York Militia Flank Company was still part of the York command in 1813 when the Americans landed at the Humber. It may have taken part in the hotly-fought skirmishes near Sunnyside. The company then retreated to Kingston with the rest of General Sheaffe's command.

After the capitulation of York the Americans sent parties up Yonge Street to commandeer supplies, but it is not likely that they penetrated beyond the Ridges. The absence of some able-bodied men on military service of one form or another would upset the life of the area and cause hardship to some families, but there were some compensations. The troops required far more supplies than Upper Canada could produce. There was a ready market for every kind of farm produce at steadily rising prices. The army paid in cash, so that more gold and silver was circulating than ever before, or for many years after 1816. The enemy's activities on Lake Erie made that route to the west unsafe before they achieved control in 1813. As a

Old house on the Gwillimbury Townplot at the Upper Landing. This was probably the house for which Joseph Johnson took out an innkeeper's licence in 1820. It has recently been restored.

Dressed-log house on the western part of the plot, possibly an early one improved after 1850. Two hearths would make such a house "Taxable". There are others on the plot with the logs covered by later facings.

The Holland Landing Anchor. Forged in England for the shipyard on Georgian Bay, the anchor was teamed up Yonge Street in 1815 after the Peace Treaty had already been signed at Ghent. When the Naval Reserve was sold it was left lying near Soldiers' Bay where the teamsters had abandoned it. In 1870 it was moved to the "driving park" granted to the Village of Holland Landing from the Gwillimbury Townplot.

result the other ways of reaching Lake Huron became still more important, and of these Yonge Street was the shortest and cheapest. The north-west traffic increased before the establishment of the Naval Station and in 1814-15 a very large quantity of stores passed up to the landing. These included heavy goods for the dockyard as well as cannon for arming the vessels and protecting the post. The resources of the district must have been strained to provide teams for this transport. The annoyance of having oxen and horses commandeered at inconvenient times would be compensated by payment in hard money for food, lodging and fodder. It must have been disturbing to the quiet Quaker families to have troops billeted on them, who drank, smoked and swore and were notoriously careless with fire.

A store house and some log huts were now built at Soldiers' Bay. Part of the traffic was carried on sleighs by way of Newmarket to Roche's Point, where the Government had also surveyed a townsite in 1811; but a great deal, including much of the heavy freight, was teamed to the Landings and carried by water to Kempenfeldt Bay. When the dockyard was proposed, the local militia was sent to cut part of the road from the site of Barrie in preparation for its being "made" by a detachment of soldiers under Dr. Dunlop the following spring.*

The opening of this road was to be of the greatest importance to the Holland area, though the military traffic seems to have decreased sharply in 1815. It left a monument in the great forged anchor that still lies in the park near the old landing places. This was made in England for a large vessel being built at the Nottawasaga and teamed with enormous trouble up Yonge Street until it had almost reached the Landing Place. Here, according to the story, a horseman overtook the teamsters with the news that peace had been officially declared and the anchor was abandoned with cheers where it rested.

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* A townplot in Kempenfeldt Bay and settlement road to Georgian Bay had been surveyed in 1811. Edgar, "Ten Years in Upper Canada" (Ridout Papers), 1890, page 54.

When this occurred in 1815, the abandonment was intended to be only temporary, for, until the Rush-Bagot Treaty of 1818, there was little reason to suppose that the dockyards would cease work altogether. Even after this treaty limited armaments on the lakes to a few small police vessels, the Government proposed to put the smaller naval stations into "cold storage" and maintained small garrisons at Drummond Island and the naval posts. In 1818-20 reservations were made at Penetanguishene and permanent buildings put up to house the garrisons.* But the volume of traffic was much less than during the war and no military or naval reserve was made on the Holland until more than twenty years later.†

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* The Naval Post and Dockyard had been moved to the Nottawasaga in 1815

† Probably because the land was Crown Property.

CHAPTER 3

CHANGING ECONOMY: 1816-1853

1. Development to 1840

The Northwest traffic over the Yonge Street route fell off sharply when steamers began to ply on the Great Lakes. It was cheaper to send heavy goods by Niagara Falls to the western posts, in spite of the length of the trip. By June 1816 only one schooner was in use on Lake Simcoe and it sufficed for all the summer traffic. The few inhabitants at the Landings gave a gloomy account of their prospects to John Goldie, a naturalist who stayed a week at "the farthest house" on Yonge Street in 1816, from June 27 to July 5.

Goldie was crossing Upper Canada on foot from Montreal, gathering specimens of plants and insects as he went. But, though botany was his chief interest, he recorded in his diary some valuable observations on other phenomena, including the human fauna encountered. Though parts of Goldie's diary have been reprinted more than once, the account of his side trip to Lake Simcoe is worth quoting for the light it throws on conditions in the area in the first years after the war.

Goldie left York by six a.m. on June 27, but did not reach the Landing until evening, for he had "gone on slowly" because of the unusual heat.

> "At nine a.m. the thermometer stood at 84. The roads were now again become remarkably dry and dusty, so that when any wheeled carriage passed I was involved in a cloud of dust which was extremely disagreeable (sic). This was the best road that I have seen in Upper Canada, and since I left York there have been more waggons travelling this road than on all those I have seen since I left Montreal."

The reduction of Northwest freight had not solved the traffic problem, for wartime shortages still prevailed to the benefit of the Yonge Street farmers.

The Holland Marshes proved a good hunting ground for rare plants and curious insects. Common insects were rather too plentiful:

> June 28 - "As the house at which I stop is situated in the midst of woods and marshes the mousquitoes have been exceedingly troublesome these two days past. It is impossible to sleep during the night, for they are quite as plentiful and every way as mischievous as during the day."

This remark, taken with Goldie's description of the river, confirms the idea that "the farthest house" was Amos West's. This is shown on the 1811 plan between Soldiers' Bay and the "Indian Landing", later the steamboat landing. West and his neighbours were vague as to the breadth of Lake Simcoe, but they told Goldie it was between thirty and forty miles long, probably including Lake Couchiching in their estimate. He goes on:

> "On the South side there is what is called a river, which although of no great breadth has yet sufficient depth to allow schooners to come to the Upper Landing Place which is nine miles from the Lake and thirty-six from York. This river apparently is Stagnant and the water has more the appearance of flowing from the Lake than into it."

He then gives a tolerably exact account of the portage to Georgian Bay and makes the statement about the traffic over it, given above. Goldie thought this traffic was likely to revive before long. A company of the 70th Regiment had arrived on the evening of July 3, coming from Drummond Island where they had been stationed since 1814. They had been relieved by two companies of the 68th Regiment, who must have passed through the Landing a short time before Goldie's arrival.

Four days of rain had ended that evening, so that Goldie was able to observe a comet with a long tail that appeared to the north-west on July 4.

> "Some superstitious people here are firm in the belief that it prognosticates a war with the United States, as one appeared before the late war. All around this part of the country you hear of wars and rumours of war."

The following day he started for York at ten a.m., his specimen book doubtless as crammed with rare plants and his hat with insects as when he had arrived in York from Montreal. As he had a fine cool day and had started so late, he took it easy and walked only twenty-four miles before stopping for the night.

The winter traffic by Newmarket and Roche's point was not affected by the use of steam on Lake Erie. Newmarket at the time of Goldie's visit was experiencing a burst of prosperity that changed the little mill hamlet into one of the more flourishing villages of the Home District. During the war the Indians had begun coming to trade in greater numbers and voyageurs from Drummond Island were bringing their furs all the way to Newmarket for sale. William Roe began his long association with the village in 1814. He formed a partnership with Andrew Borland and William Laughton and in 1816 they bought five acres from Elisha Beman on the north side of Water Street between Main Street and the river. Here they built the store occupied by Roe for more than sixty years. A few years later John Cawthra built a third store on the opposite corner of Main and Water Streets.

The return to normal conditions tended to move the fur trade farther north, and when the Government moved the distribution of Indian presents and Treaty payments to Holland Landing the Indians gathered there in large numbers once a year. The Newmarket firms, however, managed to retain a large share in this trade by establishing posts beyond Lake Simcoe and later at the Landings. Borland, Laughton and Roe had a post at the Narrows between Lakes Simcoe and Couchiching, where Andrew Borland seems usually to have lived. Later Captain Laughton moved to the Upper Landing. Peter and William Robinson were also concerned in this northern trade, probably with the help of their stepfather, and the latter's son, Eli Beman, was operating a schooner on Lake Simcoe. The Indian trade increased during the early 1820's and was probably at its peak about 1825. When settlers began to move north of the lake in larger numbers, the regular fur trade necessarily declined, though the annual assemblies to receive the presents continued to bring hundreds of Indians from far to the north and west to camp on the open spaces of the Gwillimbury Townplot. Visitors came from York

to see the ceremonies and travellers were again using the route to reach the western posts, now controlled by the Hudson's Bay Company which had absorbed the rival Northwest Company. However, even when Elisha Beman died in 1821 the Newmarket traders were at least as much concerned with the settlers across the Holland in Gwillimbury West and beyond Lake Simcoe as with the Indians.

Elisha Beman had left his house and fifty acres in Newmarket to his widow for life, so that it was in his mother's house that William Robinson entertained Sir John Franklin in 1825 on the way to his second overland expedition in the Arctic. Franklin himself mentions this visit, which became the best remembered event of the 1820's. He was already famous for his first exploration of about five years earlier, and the mystery surrounding his death twenty years later and Lady Franklin's stubborn insistence on solving it impressed his name on the public mind.

Immigration into Upper Canada and the granting of Crown Land to settlers had both ceased during the war. Though land grants were resumed in 1815, in the Home District it was seven years before the number of grants approached the yearly average of 1805-12. By that time the great influx of immigrants from overseas was well begun, though still small compared to that of the thirties and forties. The authorities had foreseen this movement (checked since before the American war) and had begun to prepare for it as soon as peace in Europe seemed assured. The treaty payments distributed at Holland Landing included part of the price of huge areas bought from the Mississaugas and other Chippewas in 1818-25. These connected the Crown Lands on the Ottawa with those on Lake Simcoe and opened almost all the area south of Georgian Bay to settlement whenever it should be required. With the possibility of fresh trouble with the United States always in mind, a settlement policy was adopted that influenced the development of

Upper Canada until 1841. To provide easier and more secure movement of troops and material in case of war, settlement was to be directed chiefly to the interior lines of communication, especially the water routes. These were being explored at this time with a view to improving them by deepening channels and making canals around rapids and over divides. Among others, canals were proposed from the branches of the Holland to the Humber and Rouge, and from Lake Simcoe to the River Trent and Georgian Bay. Nothing effective was done about these schemes, though a considerable sum had been spent on the Trent below Fenelon Falls by 1841 and the Humber-Holland Canal continued to be talked of after the railways had made it unnecessary. However, the settlements that were to protect these lines of communication and the settlement roads opened in connection with them had a marked effect on the development of the area.

Until 1826 the Government was concerned with military settlements on the Rideau-Ottawa System (the only canal actually completed as a public work at this time). However, orders were given for townships in the newly purchased lands and for townships in the old purchases to be completed. The contract for the survey of the back concessions of Gwillimbury West was given in May 1819 to Gabriel Lount, who had come to Canada in 1811 and bought Lot 84 East of Yonge Street, one mile north of Aurora. Lount was an English surveyor who had practised for twenty-five years in Pennsylvania before moving to Yonge Street. He had recently become a Deputy Provincial Surveyor "in order to instruct a Son in the practice of Surveying, to whom he has already taught the Theory". Gabriel Lount freely confessed that he was too old to do much work in the bush and it was George Lount, assisted by his elder brother, Samuel, who carried out the actual work of this survey and later laid out several adjoining townships under contracts taken by their father and other qualified surveyors.

Settlers began to cross into the new survey of Gwillimbury West in 1819. The first crossing was south-east of Bradford at the end of the Fifth Concession where there was a ferry. From that point they spread north and westward. More came in the early 1820's, after a causeway and bridge had been built with government help near the present highway. This movement could not compare in numbers to that of the thirties, when the Government began to direct immigrants to the area. But even before 1826 it was bringing a village into existence at Holland Landing and enabling the settlers in this part of Yonge Street to sell their lots to advantage and move to new locations in the back concessions. Yonge Street was for a time the only road to this whole northern region. Until mills were built and stores opened in the new townships the settlers there had to depend for these services on those near Yonge Street. It was at this time that sawmills were built in King Township and that the interior concessions of that township really began to be occupied, as settlement advanced in the townships to the west and north. The movement of settlers up the road to Roche's and Jackson's Points (soon to be named the "Queen Street") was producing a similar effect on the western parts of Whitchurch and Gwillimbury East.

The change was particularly noticeable at Newmarket. The village that Franklin visited in 1825 was a larger place than it had been eleven years earlier. It had had a tavern of some sort since 1820 at least. There were probably already some tradesmen - such as a hatter, whose trade was directly connected with that in fur. But by 1828 there had been some important additions. A "common" school had been opened and a post office set up with William Robinson as postmaster. Joseph Hewitt had built a comfortable frame inn, which as the "North American Hotel" was to be the centre of many activities up to and after the coming of the railway. There was a small meeting-house and the first cabinetmaker's shop had been opened.

There were still only two frame dwellings, but there were now fourteen log houses, one or two at least with well established gardens.

New methods of granting land introduced in 1826 hastened the completion of settlement in the older townships. Unimproved wild land had been taxed for some years, though the tax was too small to force owners to sell unless prices were more favourable than they had been. Crown land now ceased to be granted subject only to fees and was sold at public auction with a fixed upset price. In the Home District as a whole this averaged 6s. to 4s. per acre - not much more than the total of the fees current after 1819. In some areas, however, the price was much higher. A good deal of land speculation developed under the new system and the price of wild land began to improve. In 1833 a settler near Newmarket estimated that in the neighbourhood of that village it was $3.00 or 15s. Currency an acre.

It was now to the advantage of landowners to sell their extra land, the more so as it now cost them something to hold it. The remaining Crown Reserves were also disposed of in 1826, the majority being sold to the Canada Company and the rest granted to King's College which became later the University of Toronto.

A number of these lots had passed to private owners by 1840, though the large blocks around Ballantrae seem to have been still vacant six years later. In 1829 the Government began to sell some Clergy Reserves each year, mostly to tenants or squatters already in occupation. A certain number of clergy lots were patented in Whitchurch before 1840. In the first four concessions most of the remainder seem to have been occupied by 1846, though a good many were still leased to tenants.

In this long-settled section there were few lots without occupants in 1836 and some had already been divided into two or more farms. Ten years later this subdivision had gone

much farther. Many of these smaller farms were let to tenants, for it was much easier to find good tenants in the 1830's than it had been ten years before. The number of immigrants without the means to establish themselves was steadily growing. These people were willing to take land on shares for a few years, until they had saved enough to take land of their own. More substantial tenants were beginning to be available. The number of immigrants with some capital was also greater than it had been. Among these were many experienced English and Scottish farmers, who did not always share the North American prejudice against renting land. They were willing to take either improved farms or wild land, at least until they had gained some experience of Canadian ways. Not infrequently such a temporary arrangement lasted for the tenant's lifetime or he was able to buy the farm from the landlord.

Many of these men were excellent farmers. Stories of their success began to be cited in the books on Canada published after 1835, usually to support the argument that settlers with capital should not go to remote bush settlements. Most colonists of large means, at whom this advice was aimed, were slow in accepting it; but from the first a few were prudent enough to realize that a small estate near a town was more satisfactory than a large tract remote from roads, mills and markets. There were several of these gentlemen farmers in the vicinity of Newmarket by 1840. They usually had bought as much land as they could afford and depended for their income on farm rents as well as farming. It is probable that tenant farmers were fairly numerous by 1836 and still more so ten years later.

Conditions in the rest of the watershed were similar to those in Whitchurch, but there were more vacant lots in the Second Concession of King than on the other side of Yonge Street. In Gwillimbury East the tenant farmer was rather less common. There was a good deal of vacant land in the Second

Built about 1830 by a well-to-do English colonist, Dawson Manor forms one of a group of large brick houses on Yonge Street between Newmarket and Holland Landing. They date from 1830-50, but few are so little altered. French windows intended to open onto a trellised veranda had been popular in England about twenty years; they did not become usual in Canada until the late 1840's.

More sober and monumental was the entrance to a three-storeyed building in Aurora, said to have been built for a bank in 1865 (now an hotel). The style of the doorway is that fashionable in 1845-55 and it may have been salvaged from another building.

This graceful doorway formed the entrance to another of the inns at Holland Landing. In the sixties a long block extended north from this hotel to the corner of the Bradford toll road. The part remaining appears to date from the late 1830's when this northern part of the village was more built up than the rest.

Concession north-east of Holland Landing. Around Sharon, however, a peculiar development had led to even greater subdivision of lots and this extended for some distance north and south of Lot 10 where David Willson had built his temple.

2. The Children of Peace

Although the sect calling themselves Children of Peace was founded a few years before the War of 1812, it was not till about ten years after it was over that their fame spread beyond their own district Their prophet, David Willson, says that he was born in Dutchess County, New York State, and came to Canada in 1801. A little later Willson brought his family to the vicinity of Newmarket and joined one of the Quaker Meetings, acting for a time as their schoolmaster. In 1805 he patented Lot 10, Con. II in Gwillimbury East Township. He was then about 27 years old and had probably been living on this lot for at least a year.*

Willson had been brought up as a Presbyterian. He had had only a very moderate schooling and is said to have been a sailor and made voyages to China. This experience of the East may have strengthened a tendency to mysticism which was to express itself in an elaborate symbolism. A thorough study of the Bible had given him a considerable command of words, but the effect of his speeches must have depended largely on sincerity and the prophetic fervour of the manner, for the matter, when read, is not impressive. He was probably only too ready to exercise this gift, for vanity and egoism were mixed in his character with other better qualities.

Willson says that after about seven years as a Friend he began to give utterance to views too unorthodox even

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* Willson says he became a Quaker "a few years" after he came to Canada, so that his term as schoolmaster may have followed his improvement of Lot 10. The regulations required a year's residence before patent could issue. The date usually given for his joining the Friends is 1802.

for the wide tolerance of Quakerism. He was "disowned" by the meeting and with six others, who withdrew at the same time, founded a new cult that had for its centre his Gwillimbury farm. Some of his followers obtained land in the neighbourhood and a little community grew up along the Third Concession Road. This will have been in 1809-12.

Willson's language is so obscure that it is difficult to determine what were the doctrines that shocked the Quakers. His "discipline" was partly a combination of early Christian and Jewish practices, as he imagined them to have been. The sixteen pillars of "David's Temple" bear the names of the Twelve Apostles and the Four Christian Virtues, but in his Meeting-House sixteen pillars were named for Old Testament Worthies and the seventeenth bore the text "Our Lord is one God". The discipline borrowed many features from Quakerism, including the rejection of violence. During the war the members probably claimed the exemptions extended to the Quakers, Mennonite and Tunkers. As they were not yet a recognized sect, this will have brought them into conflict with the local authorities over militia service. Their tendency to withdraw themselves from the world cannot have been popular in a pioneer community.

Certainly enough ill-feeling had been stirred up to make Willson fear that he was about to be driven from the country. In a pamphlet, issued in 1815 and intended to express a passive loyalty, he mentions scandalous reports that were already current. The fact that the number of Davidites was growing slowly larger would tend to increase this opposition, but Willson's fears seem to have been groundless. The Children of Peace may sometimes have been difficult neighbours,* but there is no evidence that the Government thought them dangerous.

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* On May 5, 1812, Colonel William Graham informed the Surveyor General that Mr. John Bostwick was likely to have "Sume deficulty...with sume of his nighbourres in East Guillensbury in fencing upe one half of the road between Whitchurch and that Townshipe..." It is possible that some of the neighbours were Davidites.

In 1814 the community had been able to build a small log meeting-house with an upper room where the choir practised. The rejection of music in worship had been one of Willson's differences with the Quakers. Music played a great part in the new cult. It was one of the features that attracted new members. In the winters of 1818 and '19 "the Davidites' Choir was in its fullest tide of musical study. Many evenings during the winter, sleighloads of young people drove to the meeting-house, where the choir met in the room above, and joined in the singing.".*

It was Willson's ambition to make the harp of David sing again.† The progress of the community in numbers and worldly goods soon enabled him to provide a better setting for the simple ceremonies of his sect and their musical accompaniment. In 1825 the Children of Peace began the Temple that still stands at the east end of the lot patented by David Willson in 1805. Working at intervals they finished it in seven years. Most of the materials were produced locally, but a considerable sum must have been needed to pay for such costly items as the 2,952 panes of glass, the gilding of the five balls that crown the central lantern, and the four lamps on the corners of the "ark" or cabinet that stands below it.

Few places of worship in Upper Canada could compare to this Temple in size or in elaboration of detail and none had taken this particular form, though it is one sometimes used for churches and meeting-houses in countries that Willson may have visited. The small lanterns that decorate the corners of each stage seem, however, more like a reminiscence of eastern temples. Each detail and dimension had a symbolic significance,

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* From the pamphlet issued by the York Pioneer and Historical Society for distribution at the Temple Museum, Sharon, Ontario.

† These words, or something like them, are used in the manifesto printed with a sermon of Willson's which he gave to Patrick Shirreff in June 1833. Shirreff prints these in full in his "A Tour Through North America", 1835.

worked out by the prophet. These control the design, but the good proportions that save the Temple from being merely fantastic are probably due to the skill of experienced builders who were now to be found among the brethren.

For a short time the Temple was used for the regular monthly meetings at which the members made small offerings of money.* These formed a fund from which the expenses of the church were met and what remained - usually the greater part - was used to help the aged and unfortunate. Apart from this the community was organized on co-operative lines; everyone was free to follow his chosen calling and dispose of the proceeds as he saw fit. "The produce is sent to York, weekly, in common, yet all are left to guide themselves." Once a year on the first Friday in September, the Temple was lighted with 116 candles for the feast of "First Fruits", at which offerings were also made and to which strangers were welcome. This was followed by a substantial supper, called a "Love Feast", served by young women dressed in white to the members and their guests.

Casual visitors now began to come to "Hope" or "Davidstown"out of curiosity in numbers that the Children of Peace found inconvenient. Accounts of the community were published, some sympathetic, but others repeating the slanders circulated twenty years earlier. David Willson had announced that he could not enter the Temple now it was finished.† For these reasons the leaders determined in 1833 to build a meeting-house for the monthly meetings and the Love Feasts, and to close the Temple except at the Feast of First Fruits. The new building was finished in 1842. It was nearly twice as large as the

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* W. H. Smith, Canadian Gazetteer, 1846. According to Smith the offerings totalled $8 a month and $1,500 had been collected since 1832. Smith gives a description of the Meeting-House.

† This is stated in the manifesto already referred to, but the reason for it is not clear. Willson may not have kept to his resolve. The same document says that the Meeting-House had already been begun and gives the reasons for closing the Temple. See Shirreff, op. cit.

Temple and in many ways a more curious building. It is said to have cost $2,500 raised by special subscription.

When Patrick Shirreff visited Hope in 1833, it consisted of about sixty or seventy houses, "scattered up and down" as many members lived on farms of from twenty to a hundred acres. Not all of these were the houses of members, for in the following year the membership "in Hope" is placed at about 280. Not all members lived in the settlement. At this time Willson, Murdoch McLeod and others were going regularly to York and Markham to preach, travelling in wagons covered with white tilt-clothes, and apparently accompanied by part of the Choir. However, the Children of Peace were never a large body.

A second feast had been instituted by 1846, on the first Friday of June, in honour of Willson's birthday (June 4). Later this was known as the "Passover". As many as 350 people sometimes attended these services and the suppers that followed. Opposition to the sect gradually disappeared, but its numbers were probably already declining when Willson died in January 1866, aged 87 years and seven months. However, weekly meetings were now being held every Sunday. "Two first class brass bands officiate in the religious exercises discoursing both sacred and secular music every Sunday afternoon in the Temple grounds."* Twenty years later the last meeting was held and the buildings stood vacant and unused. The meeting-house was torn down long ago, but the Temple and the little counting-room† survived and in 1918 were acquired by the York Pioneer and Historical Society. They have been carefully restored and are now very nearly as they were in 1833. The Temple is used as a museum, open during the summer.

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* Mitchell and Co: Directory of Toronto and York and Peel Counties, 1866.

† This is often called "Willson's Study", but the name "counting-room" is given to it by Patrick Shirreff in 1833 and probably indicates its original use as an office.

3. Samuel Lount and the Troubles of 1837

During the first twenty-five years of settlement the inhabitants of the area seem to have played little part in the political agitations that some times disturbed the life of the Province. The Quakers were a peaceable people and after they had obtained their patents under Governor Hunter's threat of "un-Jarvising" the Provincial Secretary, they seem to have held aloof from such movements. They did not sign the petition of complaint presented to Governor Gore, which bears the names of many Loyalists located on Yonge Street below Richmond Hill. In 1806 they sent Gore an address of loyalty from their meeting, signed by Nathaniel Pearson as clerk, and presented by Timothy Rogers and Amos Armitage.

For some years before and after 1820, one of the two members of the Legislative Assembly for York and Simcoe was Peter Robinson of Newmarket. This was probably agreeable to the freeholders of North Yonge Street; for Robinson was able and energetic and his large holdings in the area made him an active champion of the interests of his constituents. At this time, however, the Robinson brothers were actively building up the family fortunes and extending their interests in Simcoe County. This must have brought them into frequent collision with some of their neighbours, who were attempting to do the same thing, in some cases with greater resources. Besides, a new generation was growing up, and opposition to government policy and to the ruling clique was growing steadily embittered.

The Robinsons had always been socially connected with the "Family Compact" by early associations and by the marriages of their two sisters. The talents of the two elder brothers were now making them leaders in this group. The fact that, in matters not directly affecting their loyalty to the Crown and the Church, they took a wider and more liberal view than many of their party, make them useful to Governors who had sometimes to force through reforms, in the teeth of a Legislativ Council more "royalist" than the Royal Government.

In 1827 Peter Robinson was appointed to his father's old post of Surveyor of Woods and Forests and to the much more important new post of Commissioner of Crown Lands. These appointments ended his residence at Newmarket, and his appointment to the Legislative Council removed him from the Assembly. They did not terminate his connection with the district, and in the Gwillimburys and the region beyond Lake Simcoe this influence was, if anything, growing greater until his death in 1838.

The youngest brother, William B. Robinson, had come to Newmarket when he was still a child. He was now taking an active part in local affairs, was postmaster, Justice of the Peace and Colonel of Militia. His interests were also stretching out into Simcoe County, and after that county was given separate representation in 1828, William B. Robinson was the first Tory candidate for the seat.

By this time new men had come to the fore in North York, both sons of pioneers and later arrivals in the area. Some of the York Ridings were already beginning to elect opposition members. Robinson, however, was able to defeat John Cawthra of Newmarket, after the usual rowdy election at Holland Landing. Robinson kept open house at Phelps' Tavern near his mills, and Cawthra at the Upper Landing. At least one Irish settler feasted all week at Robinson's expense and on the last day voted for Cawthra. At that time voting was done openly, unless one or the other side demanded a ballot.

In the election of 1830 Robinson again defeated Cawthra. In fact he continued to represent the County, except for one parliament (1841-44), for the next twenty-four years. Before the next election in 1834, Simcoe was given a second member and this time Samuel Lount was elected as well as Robinson. Lount was then about forty-three; he and his brother George had been living near Holland Landing for nearly fifteen years. Their activities as surveyors had placed the Lount family among the

larger landowners in Simcoe County and had brought the brothers into contact with many of the settlers. Samuel Lount seems to have been respected by many of his political opponents. His kindness and generosity had endeared him to many new settlers. On many points he was more in agreement with the moderate reformers, but his impatience with the Family Compact, his sympathy with the poorer settlers, and his own interests eventually brought him into the extreme group.

This group was well represented near Yonge Street in King and Whitchurch. The Fourth Riding of York was to some extent a safe seat for the Reformers. Lount had many devoted followers aroung Holland Landing and among the native-born settlers in Simcoe County, but many of the recent immigrants supported the Tories as the government party. When Sir Francis Bond Head dissolved Parliament in 1836, the contest was bound to be a violent one. The Governor exerted himself to ensure a Tory victory. The Reformers succeeded in holding three of the four York seats, but Lount was defeated in Simcoe and the new house contained 45 Tories to 17 Radicals.

This result drove the extreme Radicals to despair - all the more because it was partly achieved "with the aid of intimidation, violence and fraud". In Simcoe in particular, the Governor was accused of issuing a large number of new patents and Lount believed he had been defeated by the fraudulent votes of recent settlers and absentees.

The patents had certainly been issued, but to prove that some were fraudulent or that any were fraudulently used would have been difficult in 1836 and is now hardly possible It is believed that the improper methods used by the Governor and the Tories had less effect on the election than was thought at the time. Certain sections of the Reformers were already nervous of where Mackenzie was leading them, and others were alarmed by his violent language which seemed to threaten civil war, such as had already broken out in Lower Canada. However,

the belief that they had public support and had been unfairly deprived of their just victory at the polls, certainly made many Reformers, and Samuel Lount in particular, more ready to accept the violent measures urged by a small group around Mackenzie that included Nelson Gorham of the Newmarket family of woollen factors.

This group was urging rebellion, but Lount maintained at his trial that to the last minute he had believed that an armed demonstration was all that was intended. Preparations were made and arms prepared in the autumn of 1837. The rising was set for December 7, but on December 2 Lount received a message from Dr. Rolph in York changing the date to the 4th. Lount disapproved of the change, but he and Anthony Anderson gathered 100 men around Holland Landing and marched south by back roads, gathering recruits as they went.

The events of the next few days are well known and took place outside the watershed. After the Rebels had been scattered at Montgomery's Tavern, the Militia Volunteers spread out through the country arresting every one suspected of Reform sympathies, confiscating arms and horses and turning the whole district upside down. A great many of the inhabitants of the watershed were taken and lodged in the old Presbyterian Kirk at Newmarket. Some were released, but a number were marched to York. Many had no connection with the outbreak and were released almost at once. The official list of prisoners in the Home District, however, contains a number of names from this section. More prisoners were released after a short detention, and a number had escaped to the United States. Among these was Nelson Gorham, who had been sent with a message to Dr. Duncombe at Scotland and was able to join Mackenzie at Navy Island. Adam Graham is listed among those arrested, but he also reached Navy Island and was one of the "Provisional Government" formed by the Patriots.

Samuel Lount was also listed in this "Government" but he was unfortunately not present on the Island. After hiding for a time in King he had attempted to escape to the United States, but was arrested near the Grand River and brought back to York. At his trial for high treason, he pleaded guilty, and so left the Chief Justice no alternative but to pronounce sentence of death. There could be no doubt of Lount's guilt, but apart from considerations of mercy, it would have been far better policy for Sir George Arthur to have yielded to the many pleas for his life and commuted his sentence. The hanging of Lount and Matthews gave the Radicals martyrs, who have not yet been forgotten.

This clemency would have been approved by the British Government, which at that time was inclined to be conciliatory. The great majority of the rebels were pardoned under an amnesty proclaimed by Lord Durham in 1838. Some leaders, however, were excepted, including Nelson Gorham and several inhabitants of Gwillimbury East and Holland Landing. One of the latter, Alexander McLeod, died in Tasmania, where he had been transported after being captured in the "Short Hills" Raid on the Niagara Peninsula. The rest were pardoned when the amnesty was extended in 1841 and most of them were living in the watershed in 1861.

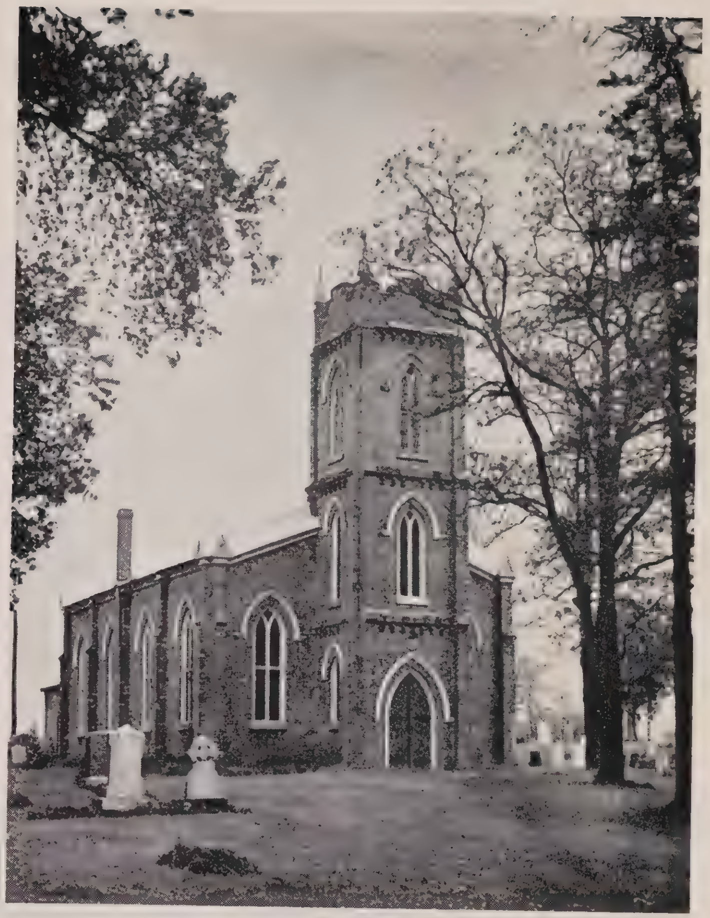
The outbreak had accomplished very little directly and a long struggle was carried on after the Union of 1841, before the Reformers could complete their work. In this contest the inhabitants of North York continued to support the Reform Party in most elections, but after 1844, Simcoe County (now represented by only one member) continued to elect William Robinson.

4. Fifteen Years of Progress - 1838-1853

(a) Completion of Settlement

Apart from the local disturbances resulting from political unrest there had been a serious business depression

St. Paul's, Church of England – Holland Landing, founded 1843.



Friends' Meeting House on Yonge Street near the old road to Newmarket. The first meeting house in the area stood here with the burying-ground beside it.

Episcopal Methodist Church (now United) at Holland Landing – built in 1843 on land donated by Chief Justice Robinson, member of the Church of England and of the Family Compact.

in 1837. This was not so bad in Upper Canada as in the United States, particularly in the Mississippi Basin, but it helped to make 1837-39 years of anxiety and strain. Many inhabitants of the area were still in exile or had left voluntarily; immigration had fallen sharply; prices were low and credit dear. Recovery in the early forties was slow, but it was helped by a gradual increase in the numbers of new settlers, by the money they brought with them and by the return to political stability that followed the Union of 1841. Though the political disputes continued, they grew gradually less bitter and there was no more talk of rebellion or secession, except among some Tories in 1848.

A number of partial reforms, intended to pave the way for permanent settlements, were carried out in 1841-2. The British Government provided loans for road-building, canals, and other projects, and British capitalists began to take more interest in Canada. Though railway development lagged till the last years of the decade the other means of communication were completely overhauled in the 1840's. A great deal of progress had been made by 1846 and the effect of this was evident in the Upper Holland Watershed. When the flow of immigration reached a still higher peak in 1847-51 the watershed and particularly the villages began to flourish as never before. The western part of the area was already almost completely occupied, but there was some room for expansion even in the countryside. The Canada Company was beginning to dispose of more lots in the eastern section and the Clergy Reserves were being sold. The full settlement of this area did not take place until after 1853, but it was well started by 1851.

When the building of the "Ontario, Simcoe and Huron Railway" was under discussion in 1850, an argument arose as to which side of Yonge Street the line should run. A pamphlet of 1850 attempts to prove that Vaughan and King Townships were going ahead faster than Markham and Whitchurch. The

statistics it contains do show a more rapid advance in King than in Whitchurch in population, number of mills and production of wheat and lumber; but some figures give the impression that in certain important ways the settled part of Whitchurch was in advance of King Township as a whole and it had less of a "Backwoods boom" economy. Conditions in the first two concessions of King and in the south-west corner of Gwillimbury East were very similar to those in the western part of Whitchurch, for these areas formed really one small region. This section was passing out of the backwoods stage and the years of railway building (1851-53) did much to complete the change.

(b) The Growth of Villages

The change was even greater in the case of the villages. Five or six of these places, large and small, had their beginnings between 1825 and 1840, but it was in the forties that they grew into places of some importance. In 1820 Newmarket was the only village in the watershed, for the settlement at "Hope" was only a better-than-average occupied clearance. In the next fifteen years four other such centres had come into being. Holland Landing was by far the most important of these before 1853.

(1) Holland Landing

The beginnings of the village of Holland Landing are to be found about 1820, but at that date it must have been doubtful where the village would form or whether there would be three hamlets between the crest of the southern hill and the lower landing. Though there had been settlers on the site since 1802, there was nothing approaching a village in 1816. In the next few years a group of five or six houses grew up at the Upper Landing around the large log house in which Joseph Johnson seems to have been keeping a licensed inn in 1820. At that time the Lounts seem to have been keeping another inn on Lot 103 at the top of the hill and here the first post office in Gwillimbury West was opened with George Lount as postmaster.

This might easily have been the centre of a village and a group of houses did form there, but Peter Robinson now took an active hand in the fate of the area.

Robinson's interest in the landings dated back to 1811 when he had obtained a grant in fee of the former Clergy Reserve, Lot 109 East, and a licence to occupy the new glebe on Lot 110 East. The war had interrupted his plans, but he continued to buy lots in the neighbourhood until he controlled the east side of Yonge Street from the foot of the hill north to the Gwillimbury Town Reserve. On the west side his property extended from Lot 103 to 106, but he did not acquire the lots on the west side between the north slope and the Upper Landing.

About 1821 Robinson built the Red Mills near the site of John Eves' sawmill and a few years later put up near it a large house for a tavern, which he let to Francis Phelps. Phelps Tavern was the most comfortable inn between Barrie and Newmarket and travellers reached it with relief after the hardships of the journey through the Innisfil swamps and over the hills in Gwillimbury West. Even those who came by water were glad to hurry away from the mists and mosquitoes of the Landings and refresh themselves at Phelps.

A collection of cottages soon grew up around the mill and tavern. But from about 1830 there was a demand for house lots on the high ground north of the river and the owner of Lot 108 East appears to have begun to sell the frontage in small parcels without laying out a regular townplot. The village naturally grew quickly after the launching of the first steamboat and the substitution of mail coaches for stage wagons. In 1835 Robinson laid out a small townplot on Lot 107 East extending to East Street, naming one of the streets Christopher after his father. He seems to have called his village Beverly in honour of his brother and uncle but this name did not commend itself to the Post Office Department since there was already a "Beverly" post office. The Post Office was called Holland

The old Royal Hotel, Holland Landing. Thomas May owned this luxury hotel before 1846 and it was considered the best inn during the 1850's. Certain details suggest that May enlarged an existing house. The stucco covering the brick was probably added by his successors about 1860.

Holland Landing — One of the "good brick houses" noted in 1851. Always kept in good repair, without important alterations, this is a good example of a conservative house of the 1840's.

Landing and this became the name of the village, somewhat to the puzzlement of travellers.

In 1836 twenty-seven householders are listed as living between Phelps Tavern and Lot 109. This would mean a population of about 135-150. If Walton's Directory of the Home District is correct there were only three households on Lot 107 and one of these was very possibly a tenant farmer, who lived outside the new plot. The rest are nearly evenly divided between the area near the mills and Phelps Tavern and Lot 108 where two hotels stood a few years later. The list includes some men of substance so that one or two of the "good brick houses" noted in 1850 may already have been standing ten years earlier. Most of these, however, were built after Peter Robinson's death in 1838 and it will have been about 1840 or later that his townplot was extended to the east and a rival plot laid out west of Yonge Street.

Peter Robinson had reserved the south-west corner of his plot for a church and burying-ground. In 1843 a Church of England was built there, possibly the existing brick church, though one account of 1866 says this was built in 1850. The same year Chief Justice Robinson gave a town-lot to the Methodists and the frame church now standing was built on it. By this time the village probably had at least two of its noted hotels, and a third had been opened by 1846. Some of the stores and industries were also probably started by 1840. In 1846 the latter included, besides the mills, a brewery, a distillery, a tannery and a foundry. Ellerby's carding and fulling mill, like his later woollen factories, was considered to belong to the village. The population was now about 260. The village boasted a doctor, a lawyer, an agent of the Commercial Bank and a ladies' seminary in addition to its stores and a full list of craftmen's workshops. There was a lively trade in wheat, but the village depended heavily on the traffic by road and water. There was a daily stage to Toronto and Captain Laughton's steamer "Beaver" left three times a week in summer.

When the Plank Road was taken through the village in 1851 the road traffic probably increased at the expense of that by steamer. The landing had been moved to "Amsterdam", where the road crossed the Holland east of Bradford. This and the growing importance of Bradford and Barrie may have had some effect on Holland Landing. There had been good progress in the last five years. One estimate placed the population at about 500. A steam sawmill had been opened. There was now a large common school with several teachers. With an even greater trade in grain and lumber and the bustle of railway building, Holland Landing must have been the busiest place in the watershed in 1853, though not the largest.

(2) Newmarket

Newmarket was perhaps growing more slowly in the 1830's. Its population had more than doubled between 1828 and 1837, but it seems to have been little greater than that of the newer village. In the next ten years Newmarket was recovering its lead in business. The industries, many of them of ten years' standing, were very similar to those of Holland Landing; but the scale was already larger, there was duplication in some lines and the list of craftsmen was larger and more varied. There may have been between 500 and 600 people in Newmarket in 1846. Most of the houses and shops stretched along Eagle, Water and Main Streets, "forming one long narrow street". On the hill across the river was a separate group of less than twenty houses.

Newmarket in 1851 was described as having "rather an old-fashioned look about it". It was a "long settled" place and appears to have escaped the general fires that transformed the centres of many such places about the middle of the century. An old view of part of the west side of Main Street in 1856 makes this clear, for most of the buildings shown had probably been standing for twenty-five or thirty years. There are only two brick buildings of fair size, both probably built since 1851.

Most of the rest were one-and-a-half storey shops of the older type, their gables exposed to the street, instead of being hidden by tall "false fronts" as was usual after 1845. The old North American Hotel and the Botsford house have the two-storeyed verandas of an earlier time.

All this would contribute to an antiquated air in 1851, but some good brick houses were being built in Newmarket in the forties and at that very time Forsyth's inn was "a new brick house with excellent accommodation for travellers, a large court room on the premises, in which the division court and offices are held". In most other ways the village was keeping abreast of the times. It had added about a third to its population since 1846. The industrial revolution had reached Newmarket as well as Holland Landing, though it is not certain whether any plants were yet using steam power. A steam saw and grist mill was built within a few years of 1851, but no sawmills are listed in the village at this time and there seems to have been less lumbering here than in other parts of the watershed. There was a considerable amount of wagon and carriage making and two of the three cabinet-makers' shops were on a large scale. The other industries, mostly connected in some way with agriculture, were moving in the same direction, expanding operations and adopting new methods to meet a changing market. Gorham's woollen factory employed twelve hands in 1851-2 and produced 75,000 yards of cloth a year. The foundry, Buntlin and Allan, was not yet specializing in agricultural machinery, but Joseph Elvidge was making the new-fangled horse-power threshing machines. These little factories were still hardly more than workshops. They were the foundations of the larger enterprises of the next period.

Newmarket, with its grammar school, division court, registry office and seven churches was the acknowledged centre of the northern part of York County. This did not add greatly to the appearance of the village. The largest of the

Holland Landing from near the site of Eves's Sawmill of 1811 and the Red Mills of about 1821. The latter were burned in 1894 and the canal works destroyed all traces of the dam. The Church of England Church on the hill marks the Robinson Townplot of 1835. The Don Trail crossed the river here and the toll road to Barrie also ran through the village before turning west to Bradford.

Wesley Corners, 1953, from the west. The store, blacksmith's shop, and cottages, that made this crossroads a hamlet in 1861, have disappeared; but the Methodist Church, one of four in Whitchurch Township in 1850, is represented by the comparatively recent building now used by the United Church.

Newmarket from the south-east bank of Fairy Lake. The first mills stood near the left end of the dam and Elisha Beeman's house farther west on Water Street facing up Main Street. A later flour mill stood near the factory chimney on the east bank, some way below the dam.

churches, St. Paul's Church of England, was also the oldest. It was a pleasing frame building in the old style and like the rest was too modest for the refined taste of the fifties. The village offered opportunities to energetic and enterprising men. If its progress had been comparatively slow, this was due chiefly to the dispersed nature of the water power provided by the Upper Holland. Water power was no longer essential to industry, but few villages in Southern Ontario became large towns that had not possessed a good supply of water power to begin with. Such places often had as many good mill sites within their limits as were to be found in the whole watershed of the Upper Holland. At no time in the nineteenth century were the three or four larger places in this area equal to more than one good-sized town by the standards of the time.

(3) Smaller Villages

The other centres in the watershed in 1851 - Machell's Corners, Bogartown, Sharon and Queensville - were still very small. Sharon was at this time a little larger than Machell's Corners. A village not directly connected with the Davidite community had begun to form there by 1830. The cross-roads was a good location for innkeepers and blacksmiths, wheelwrights and saddlers. A post office was opened in 1832 when the whole settlement consisted of "about sixty or seventy houses, scattered up and down". Probably about three-quarters of these were the homes of Davidite farmers. In 1846 Sharon was reckoned as containing about 150 people, the population of the actual village. About two-thirds of these villagers may have been Davidites.

All the trades mentioned were now represented in Sharon. There were stores and other tradesmen who served the farmers and sawyers of the vicinity rather than travellers. There was no water power in Sharon, but there were sawmills a short distance away to both east and west. In the next five or six years the population and the proportion of non-Davidites

both increased. There were said to be 200 people in the village in 1851. Another inn and a wagon shop had been opened; there was now a district school and among the newcomers was a doctor of medicine.

The village at the corners east of Hollingshed's Mills probably began soon after 1827 with the building of the grist mill. Not long after, Richard Machell opened a store at the Corners, and about 1840 a post office alled "Whitchurch" was opened in Machell's store. The post office retained this name for many years after Charles Doane had become postmaster and moved the office to the King Township side of Yonge Street, where he built the first brick house in the village in 1846. Business must have been good in the early forties for "Doane Hall" is a good-sized mansion. Besides the mills the village had a tavern, three stores and some craftsmen's shops. The first Holy Trinity Church was built of brick in 1846, as an Anglican mission from Newmarket. A few years later the Gurnett tannery was started. But Machell's Corners was still a little place of "about 100", when it became for two months a railway terminal and began to change into Aurora.

Bogartown had its flourishing period in the 1830's and 1840's. John Bogart had leased Clergy Lot 30, Con. II, Whitchurch Township, in 1802. His mills are not mentioned until many years later, but in 1836 there were said to be "several houses near the mills". These may have numbered ten or twelve by 1850. Bogartown was too close to Newmarket to grow much larger, but it had its inn, wagonmaker, blacksmith and one or two small shops.

Queensville was an even smaller place in the 1840's - a little centre with stores, craftsmen, an ashery and a few cottages. There was a direct road from these corners to the Upper Landing but it does not seem to have been much used. Queensville acquired a tannery and a post office before 1850, but seems to have had no inn until the stage line began running after 1853.

CHAPTER 4

TRANSPORTATION - 1794-1899

1. Roads

(a) Yonge Street

Yonge Street was always the principal road leading to and across the watershed. The story of its opening has already been told. Although it was "made" several times between 1794 and 1804, it remained for long stretches barely passable for wagons. From Lot 67, just north of the ridges to Lot 87, nearly a mile and a half north of Aurora, the old winding trail, improved into a wagon track by the settlers, continued to be used in preference to the straight "street". This trail ran between Yonge Street and the line of the railway, mostly about a quarter to half a mile east of the street. Just below Aurora it began to tend to the north-west until it finally crossed the street at Lot 87.

Whether the settlers used the old trail beyond this point is less certain; in any case it seems to have been given up sooner than the section below Armitage . The drive to enforce road work as part of settlement duties, begun in 1801, was sufficiently successful to establish the straight line of Yonge Street except for a few detours to avoid the worst hills, but some settlers had built their houses along "Old Yonge Street" and these wished to keep it open as a travelled road. In 1805, the Legislature voted money for the improvement of the highroads, particularly Yonge Street and Dundas Street. As we have seen it was about this time that the inhabitants were agitating to have the road "turnpiked" with a view to improving the "North-west" trade, and some improvement was probably carried out.

It was in connection with this work on the street that a dispute arose between Joseph Cody of King Township and John Starkweather of Whitchurch as to whether "Old Yonge Street" should continue to be regarded as a highroad and so maintained

by roadwork. At the General Quarter Sessions held on April 8, 1806, "Joseph Cody's petition, and other papers relative to the Yonge Street communication"were read. The bench of magistrates was so perturbed that they "ordered that a letter be written to William Graham and Elisha Beman Esquires recommending it to them to settle the differences, between Joseph Cody and John Starkweather, relative to the said communication or road, and ordered that one half the breadth of the Old Road as originally run, viz. - two Rod, or half a Gunter's chain, be left open for the accommodation of such persons as reside on the said Old Road."

As it stands this might refer to the whole length of "Old Yonge Street". Several settlers had built houses along this track on sites which were still occupied in 1861, including Colonel William Graham himself. But before that date all the old road had been closed except half a mile running north-northwest from John Starkweather's Lot 83, across Lots 84 and 85, patented in 1803 by Abraham Tucker and Robert Wilson, both of whom had built on this road. Tucker's lot later came into the possession of Gabriel Lount, who also lived on the old road, and this section, with a short road connecting it to Yonge Street at the south end, still remains in use after nearly 150 years as a memorial to John Starkweather and Joseph Cody.

Certainly there was some measure of improvement before 1812, though it is not likely that this went beyond "turnpiking". In Upper Canada this involved some removal of stumps and boulders, the corduroying of wet-places (called "causewaying" at that period) and the crowning up of the track with the plough. This produced a dirt track that was not too bad in really dry weather, but became a slough in heavy rains and in open winters was seamed with ruts. The war traffic forced some improvements, for the troops found it difficult to move by land and sometimes had to leave their baggage train still struggling in the mud. As we have seen, a new vote of

money in 1814 had made Yonge Street a fairly good road by the end of the war. It may have included some grading of hills, but it was to be many years before the road was reasonably passable in bad weather.

The increased traffic of the 1820's and 1830's was too much for the dirt road which grew steadily worse. In any case standards of road-building had altered, even in North America, though many roads in the United States were no better in the 1830's than those in Upper Canada. The bad state of the roads was one of the chief grievances urged by the Reformers, though they did not at first make any very constructive suggestions as to how the money was to be collected from a public that resented any attempt to raise taxes. In cases such as Yonge Street it had long been obvious that road work by the settlers did not suffice and that occasional grants did not bring any permanent improvement. The solution in England and many of the United States had been the formation of private "Turnpike Trusts", who charged tolls and maintained the roads out of the revenue thus collected.

In January 1830 Seneca Ketchum, James Hogg and other inhabitants of Yonge Street petitioned the Assembly for leave to set up a Road Company, raising the capital by loans on the security of the tolls to be collected. The scheme was investigated by a Committee and it was agreed that a system of tolls appeared to be the only way of keeping the roads in condition. However, there was some unwillingness to set up private companies on the "military" roads and the Committee reported that it might be a useful experiment "to allow a sum sufficient to macadamize four miles of that road to be expended and afterwards to place a toll-bar with moderate rates of toll for two years within a mile of York". The tolls were to be let by auction and the profits to be applied to the upkeep of the road "under the direction of the freeholders in the vicinity".

The scheme was not carried out exactly as recommended. Government funds were granted in 1833 and Rowland Burr was given a contract to improve Yonge Street. Burr graded the hills by means of cuts and by embankments across some valleys. He followed the straight survey line and the old detours at the hills became alternative roads. Most passed out of use, but among the two or three remaining was the one south of Holland Landing. This left the "street" at Lot 103 where George and Samuel Lount lived, and made a loop to the westward which was later included in the modern highway. At the foot of the slope it crossed the line of Yonge Street at a slight angle and continued direct to the bridge over the East Holland, a little below the mill dam. After 1833 this detour was used by loaded vehicles (and probably by careful drivers whether loaded or not) and by travellers on the old West Gwillimbury Road. The grading was done in preparation for macadamizing and at the time was regarded as a marvellous achievement.

The macadamizing, however, progressed very slowly. By 1836 it had only reached Yorkville, where the first toll gate was set up. In that year trustees were appointed for the highroads of the Home District. For "the Yonge Street Road" seven were chosen including, among other prominent men on the lower part of the Street, Charles Thompson, proprietor of the Holland Landing Stages. For the northern end of the road George Lount and his brother-in-law James Pearson were appointed. As the stone road moved northward new toll gates were set up but in 1846 it still did not extend beyond Richmond Hill. Ten years earlier the road north of Yorkville had been called "tolerable", but to this "in good weather" should be added, for the bad state of Yonge Street in December 1837 both hampered the Rebels on their march to York and helped their flight from Montgomery's Tavern by delaying the militia in pursuit.

After 1841 Yonge Street would normally have been divided above Lot 95, between the Commissioners of the Home District and those of the New District of Simcoe, of which it formed the western boundary. However, the Provincial Government soon took the Highway Trusts into its own hands. Traffic was steadily increasing, but expenses mounted with it. By 1850 the macadamizing had been carried to Holland Landing. It seems probable that most of this was done in 1848-49, though some preliminary work had been done between 1841 and the end of 1845, when the "Main North Toronto Road" had cost the Government £8,147 since the union of the Provinces. Part of this had been met out of a loan from the British Government, but a large part of the expense in the section from Richmond Hill to Holland Landing was evidently met out of the gross receipts from tolls which had been about £10,000 a year in 1848 and 1849. Even with the heavy expenses the Government in those two years made a total profit of £4,837.

In 1850 the three "Toronto Roads" were sold to a private road company for £75,100, considerably more than the Province had spent on them since 1841, but less than half the total expenditure. The price seems to indicate that the return from tolls was expected to increase, but the purchasers made a bad bargain. After the railway lines were opened in the 1850's, traffic on the roads dropped steadily. When York county bought these three roads and the Lakeshore Road in 1865, the gross receipts on all four were only $32,000 dollars a year. The County paid $72,500 for the four roads, and continued to collect the tolls until 1896.

There were two or three toll gates on North Yonge Street in 1861. One was south of Aurora, where the railway line crossed the street. Another was at Lot 97, nearly two miles south of Holland Landing. These are shown on Tremaine's Map. The northern one had been moved a mile and a half further north by 1878. It now stood at the brow of the hill above

Holland Landing. It is possible that there had been a toll bar here from 1851-58, belonging to the West Gwillimbury Plank Road.

(b) <u>The Road to Duffin's Creek</u>

There was another early road from Newmarket to Lake Ontario whose origins were as ancient as Yonge Street, for like it, this road probably followed an Indian trail or trails. This trail led inland from the mouth of Duffin's Creek. On a map of the British Dominions in North America engraved in 1813, this road is shown running straight north to the townline of Uxbridge Township, then west to the townline between that township and Whitchurch. It then ran north for a short distance before forking, one branch striking off at an angle past Musselman's Lake and across Whitchurch probably to a point between Pleasantville and Pine Orchard. From this point it is shown as running straight west to Newmarket, but it no doubt made some turns that could not be shown on a small-scale map.

This is probably true of the lower parts also, for at that date few roads followed the survey exactly. This road is described in a report of 1820, as a "crossroad" on Dundas Street. The description is too brief to give its course clearly. W. H. Smith in the map of York County in his "Canada, Past, Present and Future", 1851, shows the travelled road still striking south-east from the Pine Orchard - Glenvale Sideroad past Musselman's Lake, but now turning down the Ninth Concession of Whitchurch to Stouffville. This change had probably been made by 1827, when Stauffer's Mills were already built near the Markham Townline. In 1851 travellers to Lake Ontario would take the Markham Plank Road rather than go by Pickering Township to Duffin's Creek.

By 1861 the concessions and sideroads in east Whitchurch had been opened and improved. All that remained of the old direct road was the small stretch still in use, running south-east from Ballantrae along the south-west side of

Musselman's Lake. In 1846 settlement along this road ended at the Ballantrae crossroads and began again south of Pine Orchard. The road must have been used by many settlers to reach locations in Whitchurch about 1800-1812.

(c) A Lost Road

Another road probably used by some settlers in the watershed is shown on the same map of 1813. This ran directly north-west from the mouth of the Rouge to the centre of Markham, probably to the Reesor settlement a mile and a quarter east of Markham Village. Here the map shows it connecting with the system of roads laid out by William Berczy and his German settlers in 1794. However, there is reason to think that the trail continued north-west, passing close to the Mennonite Church south of Milneville, to the townline of Markham about halfway between Gormley's Corners and Ringwood. By 1824 most of the roads in Markham Township had been straightened to conform to the survey lines. However, John Goessman's map of that year does show one section of road running almost diagonally from near the south-east corner of Lot 31, Concession VI of Markham, to a point on the north Townline close to the end of the Sixth Concession of Whitchurch. It was probably by this newer version of the Old Rouge Trail that some of the Macklins, Randalls and Pearsons reached the lots they located in Whitchurch, near the south Townline, in 1801. Some at least of these families were Quakers belonging to the Yonge Street meeting. It seems to have been easier for them to reach Elisha Beman's house, a few years after their arrival than Captain Graham's.* Unfortunately Goessman left both Whitchurch and Scarborough blank on his map of December 1824, so we have no means of knowing whether there were any other sections of this

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* Of two settlement-duty certificates from this settlement one was sworn before Elisha Beman at "Whitchurch" in 1805, and the other in 1806. If the Townline had been the best road to Yonge Street, Asa Randall and George Sisler would have gone to Captain Graham's.

"Rouge Road" still in use at that time. Nor can we tell whether it struck across the lots to Newmarket or ran up a concession to the Duffin's Creek Road. From the pattern of settlement in 1846 it seems likely that the connection was not further east than the Fifth Concession, for though many lots in the Sixth Concession were patented before 1806, several seem to have been unoccupied forty years later.

(d) The Queen Street

The other important road in the early days of the watershed was the one that led northwards from Newmarket to the landing places on Lake Simcoe near Roche's and Jackson's Points. This also began as an Indian path, used in winter by travellers who crossed the lake on the ice. By 1794 it seems to have been more than a footpath, for Simcoe reported to England that the trader on Lake Simcoe had a herd of cattle driven up Yonge Street the first winter after it was opened. It soon developed into a wagon track, an extension of Yonge Street, though it was not so called until the latter part of the last century.

The original track may have reached the site of Newmarket by a more direct route from Old Yonge Street than was used after 1801. It seems to have followed the west bank of the river as far as the site of Reuben Lundy's Mills, then crossed the stream and followed a winding route to the site of Sharon. Even in 1836 this seems to have been the usual route from Newmarket to "Hope", and, considerably straightened, this road was still open in 1861. It then reached the Third Concession near the school house at the south end of the village. From Sharon the track ran north, following the general direction of the later road but probably winding back and forth across the survey line as convenience dictated. When East Gwillimbury was surveyed in 1801 and settlers began to enter the township, the road was probably straightened in places, but even after the town plot of "Keswick" was laid out in 1811 at Roche's Point

these windings continued to be used. One of them still appears as a by-road on the map of 1861 just south of the North Gwillimbury Townline.

The road must have seen a good deal more traffic during the war and it had probably been considerably improved by 1816. When settlers began to move into North Gwillimbury and Georgina in greater numbers, this became an important highway and its importance grew as the east shore of Lake Simcoe was settled. By the 1820's the Third Concession had been opened across Whitchurch to connect with the Third Concession of Markham and seems to have already been in use as an alternative to Yonge Street. About 1830 it was given the name of the "Queen Street", presumably in honour of Queen Adelaide, wife of William IV who succeeded in 1829.

The Queen Street was still far from being a good road in the 1840's and in summer most traffic still went by steamboat from Holland Landing. The mail went from Holland Landing to Beaverton three times a week on horseback in 1849 and there was no stage beyond Newmarket on this road two years later. By that time the road had been improved and W. H. Smith advised travellers to take the less direct route from Holland Landing to Stouffville, following the river road to Sharon past Ellerby's & Brammer's Mills and down the Queen Street by Bogartown to the Markham Townline.

The mail-rider also went by Sharon, possibly also by the river road, though the present road seems to have been open by that date. In the 1860's there was a wide choice of routes between these villages, for the regular sideroad was then open to the Second Concession and a straight "given" road led past Brammer's other sawmill across Lot 9, Concession II.

2. <u>Travel</u>

Travel on these roads was at first only on foot, on horseback or, more rarely, in wagons. As time went on wagons

were more generally used, but even after 1816 travel by wagon was slow and toilsome and travellers before that date preferred to go on horseback whenever possible. In the 1820's the horse-drawn wagon was the usual conveyance. The roads had improved, but they were still bad enough. Some mud holes hardly dried up all year; in dry weather there were dust, ruts and sand; corduroy was at best a bone-shaking torture and bridges were often washed away by floods. On the back road stumps and roots added to the jolts. It is no wonder that many travellers walked, like John Goldie in 1816.

Stage wagons preceded the coaches on Yonge and Dundas Streets. A line of covered wagons was opened on Yonge Street by 1825. By 1834 William Weller and George Playter opened a line of improved coaches. Spring vehicles were coming into use but were far from common, and "heavy going" remained the rule well into the thirties.

The conditions of travel improved with the condition of the roads. Wagons were still a common conveyance for passengers in the thirties, but after 1840 they were more often replaced by vehicles designed with a view to the comfort of their occupants. The coaches were less likely to be rickety boxes on wheels or on sleighs, with crude springs and hard seats, liable to break down or upset at any moment. They were now usually of the famous "Concord" type, specially designed for heavy service.* Some may even have been made in the famous New England Factories, but there were several coach-builders in York in 1833, so that most of the stage-coaches were probably made locally. The bodies were swung on high springs of leather and steel. These gave the coaches a swaying motion, unpleasant

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* Weller's advertisement of 1841 shows a coach of this type. They had a moveable seat between the doors which would hold at least two people. A type with four doors and three fixed seats later came into use - chiefly as a winter coach on sleighs. Such a coach was in use as a winter "station cab" in Port Hope, up to 1914.

to queasy stomachs, but reduced the bumping and jolting. The usual load was eight to nine inside passengers with perhaps one or two on top, for American coaches had no range of upper benches like those in England and "outsides" had to ride beside the driver or over the luggage "boot". For local traffic the roomier omnibus was used, with lengthwise benches for more passengers and a single door at the back. The stage line from Holland Landing had been sold by Weller in 1832 to Charles Thompson of Summerhill, who was running two coaches a day in 1850 from his offices in Liddell's Buildings at Church and Wellington Streets. They connected with the steamer "Morning" on Lake Simcoe and left Toronto at 7 a.m. and 3 p.m., apparently passing the down stages on the road. Another stage, connecting with the steamer "Beaver", then left the Western Hotel daily at 7 a.m., but this seems to have stopped running by 1851.

The time taken for the journey of 35 miles was probably about six or seven hours. In 1841 Weller's coaches were scheduled to make the 120-mile trip to Belleville in 24 hours, giving, with allowances for stops to change horses etc., a speed of about six miles an hour. In 1841 this may have been an ideal rate - rarely achieved in fact; but on Yonge Street in good weather it was probably often surpassed. Bad conditions could still reduce the rate of progress below that of a vigorous walker, but this was growing unusual and the passengers were rarely called on to bring rails from the fences to heave the coach out of the mud. Coach upsets were common in the thirties. Later the quality of drivers and horses improved and accidents of this kind became rather rare.

The coaches could hardly handle all the traffic. By 1840 the traveller who failed to obtain a place, or who objected to "the promiscuous intercourse of the stagecoach" could "without difficulty obtain a vehicle for himself, an 'extra', as it is termed in Canada, and if he has a family, or a few friends join together, the expense will be very little

more than travelling by the public stage"*. If he was travelling alone he could hire a saddle-horse, a gig, or one of the new "buggies". Owners of carriages used them not only for short trips but also for journeys of several days. Relays of horses could be hired, but often it was necessary to use the same horses for the whole journey and the necessity of often stopping to "bait" the horses slowed down progress. Breakdowns were not uncommon and meant more delay for solitary travellers. It was no uncommon thing to see a patient wife sitting alone in an unhorsed buggy, while her husband jogged uncomfortably to the nearest crossroads, ends of harness dangling by his legs, in search of a wheelwright or a harness-maker.

The slow rate of travel encouraged frequent stops for refreshment, even when not required to rest the horses. Mishaps sometimes made an overnight stay imperative even on a short journey. Inns and taverns multiplied along Yonge Street. By 1850 each village had from three to five hotels or inns and often one of these was older than the settlement. Others were scattered at intervals between the larger villages, at crossroads, at the top of the grades and in the valleys near the mills.

3. Shipping on Lake Simcoe

As has been noted, the traffic on Lake Simcoe was light in 1816. The events of the next ten years gave this traffic more importance and some new schooners seem to have been built. On the Great Lakes steamers were now taking a large share of the traffic, but it was not until 1831 that a successful attempt was made to raise funds for building a steamboat at Holland Landing. By the last day of 1831 Captain McKenzie "late of the Alciope" had collected 162 subscriptions of £12 10s.

W. H. Smith, "Canada, Past, Present and Future", 1851, Thomas Rolph had been able to hire an "extra" with four horses in such a remote settlement as Goderich in 1840.

(probably Currency) and felt justified in going to Buffalo to buy an engine that could be teamed to the Landing that winter. The vessel was expected to cost £1,250, but Captain McKenzie was prudently allowing for an expense of £2,000 and probably wanted some working capital, for he was still soliciting subscriptions.

The captain had subscribed by far the largest block - 40 shares, but the list of some seventy shareholders included many prominent men of the Lake Simcoe settlements from Newmarket to Penetang. The prospectus had evidently been circulated down Yonge Street to York and in official and military circles in the capital. Peter and William Robinson were active subscribers and the little vessel that was launched at the Upper Landing in 1833 was called the "Peter Robinson". By late summer she was carrying settlers across to Barrie bound for the Sunnidale Road. She had been poled and towed with difficulty through the mud and shallow water to the Steamboat Landing.

The Peter Robinson was too small to handle all the freight on the lake and schooners continued to be used, though some captains, like Eli Beman, transferred their operations to Lake Huron in this period. It would seem that the venture was not too profitable at first. The steamer soon changed hands and in 1834 Charles Thompson of "Summerhill" was trying to sell her, finding it difficult to manage a vessel thirty miles from his home south of St. Clair Avenue. The following year there was a steamer, the "Penetanguishene", on Lake Huron, run in connection with the "Peter Robinson" and the stage coaches. Pleasure trips to the Upper Lakes were becoming more usual. Travellers sometimes went up by Detroit and returned by Penetanguishene, Lake Simcoe and Yonge Street, as Mrs. Anna Jameson did in 1836, after attending the distribution of Treaty payments and presents at the new Indian reserve on Manitoulin Island. It was probably in connection with this that a special pleasure tour of Lake Huron was organized in August 1836. Tourists were

to be at Holland Landing by 8 a.m. on August 8 to catch the "Peter Robinson" and connect with the "Penetanguishene" the next next morning.

Eight o'clock was the usual time of starting for the "Narrows". In 1838, after William Laughton of Holland Landing had become managing-owner and captain of the "Peter Robinson", the steamer went "via Barrie and Oro, every Monday and Friday, and via Georgina and Thoriah (sic) every Wednesday". On the following days she returned by the opposite shore in each case. This remained the schedule after Captain Laughton had replaced the "Peter Robinson" with the "steam packet Simcoe" in 1840 and the "Simcoe" with the "Beaver" a few years later.

These vessels were probably larger than the old "Peter Robinson". They were having difficulty in navigating the East Branch in the 1840's.

> "The course of the Holland river is very serpentine, the stream is narrow, and in many places the bends are so abrupt that the boat in her course would frequently run her nose into the marsh, and have to be pushed off with long poles. It was a tedious passage, those seven miles, as we can testify from experience."

To avoid this difficulty the steamboat landing was shifted in 1850 to the bridge at Amsterdam on the West Gwillimbury Road which was about to be planked. A new boat, the "Morning", Captain Bell, began to run that year in connection with Thompson's stages. Two steamers were too many for the traffic and when Captain Laughton sold the "Beaver" after the 1850 season the new owners soon withdrew it. It was the "Morning" that took the passengers from the trains on the Northern line when it reached Bradford.

By building a spur line from Lefroy to the lake and founding the town of Bell Ewart in 1853, the railway company put an end to regular shipping on the Holland River. It was some years before the new port was ready, but once there was a convenient harbour on the railway near the entrance to Cook's Bay, the passenger steamers ended their regular run

there and only local freight occasionally went up the Holland for Bradford or Holland Landing.

4. Railways

Plans for building railways in Canada began to be discussed almost as soon as the first lines were completed in the United States. By the mid-thirties travellers from New York to Toronto could, if they wished, make part of the journey "in the cars". Railway companies were formed in Upper Canada, but the difficulties of financing and constructing a road in a partly settled forest country proved too great. After 1841 railways were beyond the experimental stage. There was much more public interest in Upper Canada. New companies were formed and old ones re-chartered. Among the new companies was the Ontario, Simcoe and Huron Union Railway, formed to build a line connecting Toronto with Lake Simcoe and Lake Huron. Very little beyond the work of organization had been accomplished by 1849, when The Railroads Act was passed by which the Canadian Government guaranteed the payment of six per cent interest on half the cost of construction of any railway more than seventy-five miles long.

This produced a burst of activity among the railway companies and several lines now advanced to the stage of surveys and disputes about possible routes. In the case of the Ontario, Simcoe and Huron Union Railway, the dispute with regard to the southern part of the line turned on whether the line should run east of Yonge Street through Markham and Whitchurch Townships to Newmarket and Holland Landing or to the west through Vaughan and King and possibly on by Lloydtown and Bond Head to the west end of Kempenfeldt Bay. The eastern townships were the longest settled and until about twenty years earlier had been the most populous and prosperous. The "western" party, in a pamphlet issued in 1850, produced some interesting statistics that showed that Vaughan and King had

grown faster, had more water power, developed and potential, and were producing more lumber, wheat and flour than Markham and Whitchurch.

Engineering considerations favoured the western route as far as the village of "Springhill" (now part of King City), but beyond that both engineering and economics weighed heavily for the longer route to the east, in spite of the difficulty of crossing the Holland Marshes. The line was therefore turned north-east at Springhill to cross the ridges by a comparatively low saddle, and Yonge Street a mile and a quarter below Machell's Corners. It then ran close to the old Indian trail for some miles before turning towards Newmarket and following the valley of the East Branch of the Holland through the centre of the village to Holland Landing, Amsterdam and Bradford.

On October 15, 1851, a huge crowd gathered on Front Street in Toronto, between Simcoe and John Streets, to see Lady Elgin, the wife of the Governor General, cut the first sod with a silver spade and put some earth in a specially made miniature wheelbarrow. Thirty miles had been completed by the spring of 1853 and freight trains "with a commodious passenger car" were making daily trips to "the neighbourhood of Newmarket", bringing firewood into the city. It was not till May 16, 1853, that the first purely passenger train in Ontario left Toronto for Machell's Corners. There it connected with Thompson's stages for the "Bradford Landing" or Amsterdam. For just over two months this little crossroads village was a busy place, for it was the exchange point for both freight and passengers travelling north. On July 18 two passenger trains a day began to run from Toronto to Bradford and Newmarket became the terminus of a new stage line from Sutton and the outlet to the south for the country east of Lake Simcoe.

The Northern, as it was now usually called, was soon pushed on to "Barrie Station" (Allandale), but regular

traffic to Collingwood did not start until the beginning of 1855. For more than fifteen years the Northern was the only railway that touched Lake Simcoe. There was no line to the east closer than Lindsay. Stages were soon running from Newmarket to Sutton in summer and to Beaverton in winter. In summer many passengers and most freight went across the lake in steamers connecting with the railway at the Company's new port of Bell Ewart or later at Barrie. This traffic was limited in the seventies by the construction of lines east of the watershed to Sutton and Beaverton, but it was not till after 1890 that another line was built across the area, by Vandorf and Cedar Valley (Pine Orchard Station). Later in the decade the Metropolitan Electric Railway was built up Yonge Street and through Newmarket to the resorts on Lake Simcoe, bringing the area into closer touch with the city.

CHAPTER 5

MILLING

The development of milling on the Upper Holland falls chiefly between 1820 and 1865. In the earlier period the few mills were only intended to meet the requirements of the settlers within a short radius; after 1820 a steadily increasing number of mills was producing for a widening area, first in the newly settled parts of the District, then in more distant parts of the Province. In the late 1840's a considerable export trade in flour and lumber had developed from Upper Canada. In this, as in all trade to the southward, the millers of this area were handicapped by conditions of transport.

The water-power of the Upper Holland was never so good as on the neighbouring rivers. Mill sites were few in relation to the length of the streams, and still fewer were first-class sites, where a good fall and sufficient flow could be secured by a dam of moderate length and power developed to run several mills. In fact it is remarkable that so many mills were built. It is another indication of the difficulty of carrying heavy goods by land even for short distances. In some cases a good deal of ingenuity was used in building embankments and mill races to provide power even for small sawmills that ran only for a few months of the year. In the late 1840's many mill owners were turning with relief to steam power. The dams, however, were often kept up for another twenty or thirty years, for the ponds were used for other purposes besides power.

There were probably more mills on the Upper Holland between 1860 and 1865 than at any other time. By that time there were already a number of steam mills, some water mills had been given up and some operators were using steam as well as water-power. The peak use of water-power would therefore fall a little earlier, about 1853-8, when the Northern was said to "sprout mills" on its way north and most of the old mills were still in use.

Information about early mills on the Upper Holland outside the principal villages is scanty before 1861. The statistics available are for whole townships, and the other sources are of little help in apportioning the mills to the various rivers. There was certainly a reduction in the total number of mills and still more in the number of water mills by 1880. Some sawmills were closed down before the end of the century and the abortive canal works of 1908 did away with several once important mill sites.

1. <u>Grist Mills</u>

A grist mill within easy reach was such a boon to pioneer families that it was the custom when reporting on Reserve Lots to give the distance from a mill as one indication of possible value. A pioneer family could manage without having its grain ground in a mill, but this was such a hardship that journeys of several days were sometimes undertaken to obtain a little flour. In most areas it was not necessary to do this more than two or three times, for the authorities tried to encourage the building of one mill at least in each township as soon as possible after it was opened for settlement. Lots containing mill sites were reserved for the Crown until after 1792, but the whole lot was often granted on condition of building a mill and sometimes other lands and privileges were added as a bonus. It was a grist mill that was intended in the condition attached to the grant of Lot 76 East of Yonge Street to Captain William Graham in 1796, but although he was allowed to keep this lot, there seems to be no evidence that the condition was ever carried out. There can have been no good mill site on Lot 76, but in 1861 there was a small pond on Lot 77 close to the Graham house. This may have been a relic of an earlier mill, but if so, it seems more likely to have been a sawmill on the property to the north, which then belonged to Henry Machell.

It would seem that the grist mill built in 1801 by Joseph Hill on the site of Newmarket was the first in

the watershed. This may have been enlarged after it was bought by Elisha Beman as already described. There is some reason to think that another was built in Newmarket about 1812, but the evidence is obscure and contradictory. The development of settlement in the first ten years of the nineteenth century certainly did not warrant a second grist mill, for no settlers were much more than five miles from this mill and there were already one or two in Markham Township. As the second mill at Newmarket was probably controlled by Peter Robinson, it was more an extension of the Beman mill than a competing plant. Wartime demand would, however, have soon justified this enlargement.

When Peter Robinson built his new mills near the Landings about 1821 he was looking for business more to the new settlements to the west and north than to the area around Holland Landing. For more than fifteen years this business was remarkably good. The "Red Mills" were a large and costly venture for that period. Robinson rented them on shares to Isaiah Tyson. It was said that if more water had been available these partners could have ground 200 to 300 bushels a day.

Similarly it was the development of settlement in King Township as much as increased production near Yonge Street that led to the addition of a grist mill to the Hollingshead sawmill east of Machell's Corners soon after 1827. The mills at Bogartown, however, competed with the Newmarket mills for the growing surplus of the long-settled area in Whitchurch. Lundy's Mills, situated on the travelled road from Newmarket to Sharon and only a mile or two south-east of the latter, were centrally placed in the settled section of Gwillimbury East. The Bogart mills are described in 1836 as "very extensive, turned by a copious stream". They must have been running for several years as a village was growing up near them. The Lundy mills also appear to have been running by 1836.

The first mills had operated by a system of custom grinding. The miller took a toll (fixed by law in 1792) of the grain to be ground or of the meal or flour. The farmer kept the flour needed for his family and traded any surplus to the merchant, who sent it to a more distant market in the wagons he used to fetch goods for his store. Very often the merchant was himself the mill owner, receiving part of the tolls from the working miller, and sometimes bought grain from the farmer for grinding. The conditions during the war had given a great impetus to "merchant-milling". In the thirties and forties most millers were buying grain to grind for shipping in their own wagons, and some were specializing in a better grade of flour. But most mills still did custom work in the old way and until about 1860 flour mills were seldom distinguished from grist mills.

In 1846 four grist mills are reported in Whitchurch Township. Two were at Newmarket, one at Bogartown and the fourth was certainly not on the Holland. The two mills listed in Gwillimbury East were the Red Mills at Holland Landing and Lundy's Mills. Hollingshead's mill was the only one in King Township on the Upper Holland. These six mills remained the only ones on the river for some ten years. No new grist mills using water-power were built until one was added to Jared Lloyd's sawmill at White Rose in the sixties. As a rule millers were slower to convert to steam than sawyers, but this was not the case on the Upper Holland. Barwick and Thorne of Thornhill bought the Red Mills at Holland Landing in 1838 and installed a steam engine after 1850. George Cotter, who acquired the Robinson properties in Newmarket, seems to have been content with water-power, but in 1857 Ford's grist mill was a steam mill. The new grist mills built before 1860 at Holland Landing and Queensville were steam mills and it seems probable that the Bogart mills had been using steam before that time. Another steam mill was built in Aurora in the 1860's, bringing the number of grist and

flour mills in the watershed to ten. Of these only three or four were using water-power.

By 1860 the larger village mills were flour mills doing a considerable business. Thorne's mill at Holland Landing was turning out 12,000 barrels of flour each year in 1866 and this may have been equalled by the mills in Newmarket and Aurora. In the seventies flour-milling declined in importance and some mills were closed. There was only one flour mill in Holland Landing in 1878 and apparently only one at Newmarket. Bogart's mills seem to have been gone by 1885. At the end of the century grist milling was limited to the mills at Newmarket, Aurora, Holland Landing and White Rose. The second grist mill at Aurora was by that time a chop mill.

2. Sawmills

It is difficult to say how many sawmills may have been operating in the watershed before 1830. An early sawmill may be assumed at Newmarket, for with few exceptions milling establishments before 1812 were "saw and grist mills". As a rule the sawmill was built before the grist mill and was sometimes given up when others were built in the vicinity. The only other sawmill which is certainly recorded on the Upper Holland before 1811 is "John Evse's Saw mill" on the site of the Red Mills at Holland Landing. It is not unlikely that these were the only sawmills until after the war, for the local demand for sawn lumber must have been very small and there was no convenient waterway to a larger market.

In the 1820's the demand would be greater; the Red Mills included a sawmill of some size. However, apart from this the next record is a partial report of mills in King Township made by John Goesman in 1827. These are all saw-mills and include two on the Upper Holland - one "in the 2nd Concession west of Tyler's ... belonging to Hollingshead", the other "in front of the 1st Concession on lot no. 89 ... belonging to Denis". William Tyler had patented Lot 80 West,

at the south-west corner of the Aurora crossroads, and Hollingshead's sawmill was the beginning of that village. The mill on Lot 89 West became the Stevens sawmill and was still operating fifty years later.

The Bogart mills included a sawmill and there may have been others in Whitchurch by 1836, for several owners of later sawmills were in possession of their sites. In all there may have been eight or nine sawmills on the Upper Holland by 1836. These mills were still producing for a local demand, for transportation of lumber was still difficult and costly, even for short distances. However, better houses were now being built. Most still had their outer walls of logs, but were now fitted up entirely with sawn lumber.

The difficulty of transport was one reason for the multiplication of small water-driven mills. Because most of their working parts were of wood, sawmills cost less than grist mills to set up. They could be placed on smaller streams, for they ran only during the winter and spring, while the slow-moving upright saws needed less power than millstones. Sawyers did a good deal of custom work and spent the summer farming. Some larger mills had been built by 1840, to meet the growing demand from the area around Lake Simcoe. These were mostly in the villages and large sawmills were not numerous until the railway was finished.

There were 12 sawmills in King Township in 1846. At least eight of these can be located outside the watershed, so that the number on the Upper Holland was not more than four. There were probably about as many on the Rouge in the south-eastern part of Whitchurch as well as the Randall mill at Pine Orchard. The number on the Holland in Whitchurch cannot have been more than four and may have been less. No sawmill is listed at Newmarket. Holland Landing had two, one a steam mill, and there were probably two and possibly a third between that village and Sharon. All five of the sawmills reported from Gwillimbury East may have been

on the Upper Holland. The total for the watershed would thus be about 12 to 13 sawmills. Some new mills may have been built near Aurora in King Township by 1851, for the total returned for the township had increased to 21. The numbers in the other townships remained the same, for the new mills were not in the watershed.

The mills "sprouted" by the Northern Railway were chiefly sawmills. In the Upper Holland Watershed the chief development of lumbering was in Whitchurch. John Van Nostrand had come to the township in 1853 and in partnership with George Harrison had built a steam sawmill on the site of the present mill at Vandorf. Tremaine's map of 1861 shows two other sawmills on property belonging to the partners, one south and one south-east of the village. These appear to have been all steam mills in 1861, though one or more may have begun as water mills. Daniel Williamson had a steam sawmill near Reesor Lake on the southern boundary of the watershed and there were steam sawmills at Musselman's and Island Lakes south-east of Ballantrae. There had been a steam sawmill in Newmarket since before 1857. There were four water-driven sawmills - Jared Lloyd's at White Rose, James Lloyd's in what is now the south-east part of Aurora, Thomas Coates' a mile and a quarter south of Bogartown, and a small mill between Newmarket and Yonge Street. Five sawmills can be counted in King Township. Three of these were water mills, the two others, both just west of Aurora, appear to have used steam. In Gwillimbury East a steam sawmill had been built at Queensville in addition to the one at Holland Landing and at least three water-driven sawmills were still in use. Altogether there were 20 to 21 sawmills in the watershed, 11 being steam mills. Besides these there were several mills just outside the watershed - at Oak Ridges, at Pine Orchard, Cedar Valley and around Vivian - that must have drawn some of their timber from within the area.

It is possible that the number was a little greater in the late 1850's, for some sites are shown on Tremaine's map that seem to have had mills though the symbol "S.M." is omitted. It is possible also that some sawmills attached to grist mills had been recently given up in 1861. The highest number is not likely to have been more than 25.

Some sawmills were producing fairly large quantities of lumber in the 1860's. Thorne's sawmill at Holland Landing was turning out 3,000,000 feet a year and this was probably equalled by some of the other large mills. The number of mills was much less by 1878, hardly more than in 1850. Several water mills had been discontinued. There was now only one steam mill at Vandorf, though there was a new one farther west belonging to Doctor Hunter of Newmarket. The best pine was already giving out and by the eighties lumbermen were taking trees that would have been passed over before 1870. The Van Nostrand sawmill at Vandorf was said to be cutting 1,000,000 feet a year in 1885.

By the end of the century practically all the water sawmills were gone and few stationary steam mills were to be found outside the villages. Portable mills were at work here as in other parts of the Province, but lumbering was no longer a major activity.

HISTORY
based on
TREMAINE'S MAPS of 1861
with additions
LEGEND
Roads as in 1861: Highroads improved by Government or Road Company.
Main "Travelled" roads.
Ordinary roads.
Road allowances.
MILLS ON UPPER HOLLAND IN 1861
Grist or flour mill, Water Steam
Saw mill, Water Steam
Woollen mill,
Some County churches in 1861
Mill ponds as in 1861
Early trails and later railways have been
LAKE SIMCOE
SNAKE I.
SUTTON
GWILLIMBURY N.
GEORGINA
GWILLIMBURY W.
GWILLIMBURY E.
KING
SCOTT
Petchville
CANADIAN
Branch of Holland
Lake Musselman
UXBRIDGE
WHITCHURCH
KING
MAPLE
VAUGHAN
MARKHAM
MARKHAM
THORNHILL
N. YORK
SCARBOROUGH

CHAPTER 6

THE RAILWAY AGE 1853-1900

In the 1850's the completion of a railway ordinarily meant a sudden period of rapid development to the areas which it served. The decline in the traffic up Yonge Street was, however, bound to make a considerable difference in the life of the area. Once the "Northern" had been pushed on beyond Barrie, the area ceased to be the gateway to the newer country to the north, the outpost of civilization, and settled down as a prosperous farming and lumbering district.

The change had begun with the improvement of the roads, but road traffic then moved slowly and its effect was more evenly distributed over the area through which it passed. In the case of a railway this influence was concentrated at the stations and did not include the same demand for services along the way. Most road traffic was now a matter of short journeys to the railway, instead of flowing up and down Yonge Street and some parallel roads. As the railway had been laid out to pass close to the three principal villages, its effect on the area is clearly shown in their development.

This differed in each case. Newmarket was the least affected. It was already a large village and the most important place in the northern part of York County. Its station made it the outlet for the area north and east of Lake Simcoe, for it was nineteen years before another line was built east of the watershed and nearly thirty before one crossed the area to the Lake Simcoe towns. "Queen Street" continued to be a main artery and Newmarket was in effect its terminus on the railway. The rapid growth which had begun in the forties continued with little slackening through the next twenty years. The village was believed to have about 1,000 inhabitants in 1857, just before its incorporation, and the Dominion Census of 1871 gave it 1,760. This figure may have been a disappointment to some of the citizens, for unofficial estimates in 1866 and 1869 had placed the population at 1,800 and 2,500. The next

census in 1881 showed 2,006 people in the village. For the next twenty years the official figures were under 2,150, and that for 1901 - 2,125 - was 18 less than in 1891.

During this period the industries of the village continued to be the same as in 1850 - the two flour mills (one steam from before 1857), the woollen mill, foundries, cabinet factories, carriage factories, a steam sawmill, brewery and tannery; but here as elsewhere there was the tendency for some plants to expand their operations. Manufacturing grew steadily in importance, but its mediocre water-power had given Newmarket a poor start in this respect. It owed its importance as much to its position as the market town and centre of a prosperous district, as to its mills and factories.

The foundations for this importance had been laid before 1853. There was the same expansion as in the industries. In the 1860's the number of stores and tradesmen's workshops was out of proportion to the population and it was this that probably gave rise to the optimistic estimates just before 1870. There seems to have been rather less business after 1875. Other towns had been flourishing at the same time, and some of these were near enough to affect Newmarket. The new railway through Uxbridge to Sutton reduced the importance of the Newmarket station. The country recovered slowly from the depression of the mid-seventies and the influence of the larger centres was beginning to be felt by the small towns. Newmarket was too close to Toronto to be likely to grow into a large centre. That it maintained its population and importance through the last twenty years of the century was something of an achievement, for, especially after 1890,these influences were causing many towns to decline in size.

During the flourishing period Newmarket had progressed in other ways besides the number of its inhabitants. When the village was incorporated in 1858 it already had one newspaper, the "Era". A second weekly, the "Courier", was

published in the late sixties, but this did not survive to the end of the century. A common school, large for the period, had been built in 1858. Alexander Muir was principal of this school in the early seventies. By 1900 Newmarket, like most of the older towns, could claim as at least temporary citizens a number of men who had won distinction in larger places. In the fifties Robert Simpson had worked in one of its stores and later opened one of his own, and the future Chief Justice of Ontario, Sir William Muloch, had attended the Grammar School. These are only a few examples, for the town was attracting enterprising men before 1870. The tendency was reversed in the last quarter of the century, though no more so than in most small towns.

The development of Machell's Corners after 1853 was perhaps more typical of the railway villages of the period. Unlike Newmarket, the town of Aurora owed its existence to the railway. Had this taken a different route, its history would probably have resembled that of Thornhill and other places which flourished in the 1850's and then declined until they were brought into the suburban area.

As it was, the little crossroads settlement had grown into a village of 400 people within a few years of the opening of its station. By 1865 it was an incorporated village with about 1,000 inhabitants. By 1860 a number of new industries had been added to the mills and tannery - a carriage factory, a chair factory, and a brewery - the industries of any flourishing village. More significant for the future were the Fleury foundry and the Campbell ropewalk. For many years these were the principal industries of the village, though some other plants were added in the sixties. There were two large carriage factories in 1866, one placing the chief emphasis on cutters and sleighs; a second tannery had been opened and a small brickyard. Aurora had become the centre and market for the adjacent parts of King and Whitchurch. The village had only a common school, but it

possessed a mechanics institute with a library of 600 books, housed in the store building of Charles Doane the postmaster. The Doane house had by this time several rivals; there were brick business blocks and two of the three churches were of brick. There were perhaps more stores, shops and craftsmen's workshops than at any time during the century and some of the merchants' establishments were on a large scale. A weekly paper, the "Banner", was being issued by the late 1860's.

After 1870 progress was slower. Few new businesses were begun and some of the small factories closed before 1880. However, the village continued to grow and two or three of the surviving plants began to do more than a local business. The population increased still more slowly in the eighties. The census of 1891 was the highest in that century - 1,743. The ropewalk had now been closed. The implement factory and the remaining tannery were probably the most important of the six mills and factories. There had been a second paper for a time. A waterworks and an electric power plant had been set up by 1895; several new churches had been built, and a number of houses and some larger buildings date from the 1880's and 1890's. Before the turn of the century, however, the population dropped by about 9 per cent.

To Holland Landing the coming of the railway meant an end to its special advantages as the point of embarkation on Lake Simcoe. Probably these were already less important than they had been, but until construction work was complete business in the village would not feel the full extent of the change. It has been said that Holland Landing declined after the railway was built. It would be more accurate to say that it ceased to grow rapidly. Several of the leading business men moved away, some going to the new towns to the north, others to Toronto. But this migration would hardly have begun when the village was incorporated in 1859. The village still had its mills; in fact a second flour mill (probably steam) seems to have

been opened by 1860 and David Ellerby appears to have built his second woollen mill on the Gwillimbury Road before 1861. The census of that year gives the village 741 inhabitants, a considerable advance on the highest estimate for 1850.

The village had become a market town and shipping point. In the mid-sixties the outstanding industries seem to have been Warren Tobey's tannery, "probably the largest tannery in Canada West", which employed 40 hands, Thorne's "Beverly Mills", and his smaller tannery. There seems to have been a third tannery, and in addition a good-sized brewery and possibly a second. The woollen mills, brickyard and wagon shops of 1857 were still running, though the three chair factories had disappeared. There was still some trade in furs, as well as cattle and lumber. The village had more stores than ever; all the hotels were open and it offered a wide range of services from those of doctor, dentist and veterinary to gunsmith and well-sinker. A change seems to have come just before 1871. From that year the censuses show a shrinking population and by 1891 it had fallen to 443. Some businesses had closed by 1878 and more three years later. There were still two tanneries, a flour mill and a sawmill, five stores and three hotels. It was still possible to call Holland Landing "a thriving village"; but it was a smaller place than in 1850. Though the population remained about the same, the decline continued until after 1908.

The same story of rapid growth is to be found in the rural part of the watershed in the ten years after 1853. Settlement along Yonge Street and in the adjacent concessions of King and Whitchurch had been practically complete by 1850. During the late fifties there can have been very little increase in the number of households on the farms in these concessions, but in Whitchurch the small groups of houses that had formed at some crossroads near the sawmills grew by 1860 into little villages of thirty to fifty people, not directly dependent on the land for their living. Among these were the crossroads hamlet later called "Pleasantville" and the settlement at the

sawmill built by John Van Nostrand in 1853. When a new railway line was built in the nineties, Van Nostrand's mills were to become the village of Vandorf and outlast all the others in this list. The older settlement near Jesse Lloyd's sawmill was smaller, even after the White Rose flour mills were built there; and still smaller were the hamlets at "Petchville" and Wesley's Corners.

Although Petchville and Bogartown are named on Tremaine's Map of 1861, only White Rose had a post office before 1870. At that time all five hamlets may have numbered about 200 inhabitants; ten years later they were probably even smaller, though in 1895 after it had a railway station Vandorf was a village of about one hundred. More important in the sixties were the post villages of Pine Orchard (just beyond the watershed on the north-west), Ballantrae, just east of the head waters, and Vivian directly north of the latter village. It was in the sparsely settled part of Whitchurch around these villages that most of the settlement of the late fifties took place and this will account for the rapid rise in the population of the township between the censuses of 1851 and 1861. In those ten years all the vacant lots in this section were taken up, mostly in farms of 100 acres, and many of these were soon divided into smaller holdings of 25 or 50 acres. It is evident that many of the owners of these little farms were adding to their incomes by working for the lumbermen, who were fast clearing the section of its pine. The subdivision of holdings went on in the early sixties. About 1866 the area seems to have been at the crest of its boom. Ballantrae was then a fairly large village with about 100 inhabitants. It depended to a great extent on the four or five sawmills in the vicinity, but besides its stores there were one or two large workshops or small factories and a variety of tradesmen shops. Everything indicated that Ballantrae was the centre of a thriving area.

There are signs of a change within a few years. It is possible that families were already leaving Whitchurch and

King before 1870. The difference between the Dominion Census of 1871 and the Provincial one of ten years earlier can be explained partly by the incorporation of Aurora and partly by inaccuracy in 1861. But if there had been no loss of population there had been no increase. There was certainly a change at Ballantrae. Between 1866 and 1869, both stores and the hotel changed hands; there seems to have been a sharp drop in population and in the amount of business.

In the seventies Whitchurch lost 495 people - the equivalent of 99 families. By 1881 another 510 people had gone and the population outside the villages was about the same as it had been in 1851. The same process was going on rather faster in King Township, but had less effect on the population of the watershed. The area between Yonge Street and the South Branch or Schomberg River had been detached from Gwillimbury West in 1852 and divided between King and Gwillimbury East Townships. Very few settlers entered Gwillimbury East in the 1860's. In the next decade there was a sharp rise in the population of the township, amounting to more than 25 per cent. This new settlement was due to the occupation of poorly drained land, made possible by the new methods of farm drainage. A good deal of land in the northern end of the watershed was occupied at this time. By 1881 the population of Gwillimbury East had fallen noticeably, though less than had been the case in Whitchurch. However, this loss of about 7 per cent in ten years continued in the 1890's, when the loss in King and Whitchurch was growing less than in the previous decade.

It would be easy to exaggerate this shrinkage of the rural population. It was going on at this period in almost all the older parts of Ontario and was much more marked in some areas than in this section of York County. It was a sign of the times, and the times in the seventies and eighties were by no means so good as they had been from 1854 to 1867. During these years farming in Canada West was on the whole a very profitable business. There were periods of depression and low prices, when

The average farmhouse built in the area between 1825 and 1850 had more resemblance to this modest house in Aurora than to the fine brick houses illustrated. Of medium size, it was probably built to house a tenant farmer when the site was still some way north of Machell's Corners. The lean-to kitchen with the chimney stack between it and the parlour is an early feature. Roughcast was a popular substitute for clapboard while seasoned wood was in short supply and brick costly.

An unusually pleasant farmhouse of around 1860. This lot formed part of Captain Graham's military lands and seems to have been sold to David Richardson in the 1850's.

Early bank barn at Pleasantville, showing the Pennsylvania overhang combined with a lean-to extension making a porch necessary for the doors of the threshing-floor. After 1840 vertical siding was more usual than weatherboarding.

overseas markets failed for a short time as they did in 1857-8; but as a rule the farmer could count on getting well over a dollar a bushel for all the wheat he could grow. A great part of the wheat was grown on land that had recently been reclaimed from forest and yields were sometimes very high. They were not so good on the average as individual examples would indicate and they were often drastically reduced by pest and disease, but this difficulty was overcome to a great extent by the introduction of a new variety of spring wheat early in the period. Taking one year with another, wheat brought the farmer a good return at a time when $1.50 would still buy a week's board and a plain brick house could be built for $75 a large room.

Perhaps the best years for Ontario wheat were 1854-7; but prices were higher than ever after 1859, though they showed more tendency to violent fluctuation. They reached a peak in 1867-8; from that time the general trend was downward, rapidly until 1873, more slowly in the next ten years. By then the Canadian Prairies were producing in greater quantity and there was little recovery in the price of Ontario wheat until near the end of the century when Ontario farmers had turned to other sources of cash income.

In doing so they were only developing lines of production that had depended in the 1850's largely on a demand within the Province. This home market was expanding during this period, for new sections were still being opened up, lumbering was at its height and there was railway building going on at intervals. Most important of all in this area, the demand from the towns and cities for provisions, fodder and horses was growing greater every year. In addition some export trade in horses, cattle and dairy products grew up in the fifties and expanded after 1861.

The farmer who turned to cheese-making, barley-growing or horse-breeding as a substitute for "wheating" before 1870 or to breeding beef cattle after 1875, was probably expanding a side-line that had already proved profitable on a smaller

scale. This was especially true in York County, where tradition, the Toronto market and an interest in scientific farming had produced more diversity than was the rule in Ontario before 1870. The farmers of the Holland Watershed had grown wheat with the rest while wheat was profitable, but in the western section at any rate they had not ceased to keep rather more than the usual number of cows, to make some considerable quantity of cheese and butter for sale and to devote slightly more land to turnips, potatoes, oats, hay and pasture. There continued to be a certain number of farmers who kept abreast of the times, drained swamps to increase their cropland, made a wider use of manure and lime and adopted rotations instead of alternating wheat with fallow or peas.

Such men would readily turn to the new lines as good markets were found for each in turn. They could do this without radically changing their methods. The acreage of improved land in wheat in the vicinity of Newmarket and Sharon in 1860 was probably already below the average for York County and the sharp drop that occurred before 1871 was possibly more noticeable in the eastern and southern part of the watershed. Neither the rage for growing barley nor the cheese-factory "mania" was so marked in this area as in other parts of the Province. Cheese factories were opened before 1870 and the production of cheese rose rapidly, but the cheese factory on Yonge Street between Aurora and Armitage seems to have been the only one in the watershed in 1878.

The breeding of livestock for export had expanded rapidly in the sixties. "Droving" had become a separate occupation by 1866 and drovers were to be found in all the large villages. In the seventies many residents in the area were calling themselves "farmer and stockbreeder" instead of simply "farmer" as they had done in the fifties. The improvement of breeds had gone much farther and owners were proud of their pure-bred herds and their fine shire studs. The export of beef cattle to the United States, which had been built up during the Civil

War under the Reciprocity Treaty of 1854-66, did not end when the Treaty was abrogated, while the trade in heavy draught horses increased. In the late seventies a profitable market for beef cattle was opened in Great Britain and thousands of cattle were shipped overseas. There was also a spectacular rise in the shipments of sheep and a steady increase in the export of pork.

Almost all these developments except the trade in beef cattle followed a pattern of rapid expansion followed by a marked decline, which in some cases was permanent. Dairying was declining in the seventies and did not begin to recover until the mid-nineties when the export trade in horses had been abruptly ended by the electrification of street railways. The export of sheep ended at about the same time. Production of barley had already dropped considerably by 1877 and the export trade was ended by tariff changes in 1890. There were difficulties also in other lines that had expanded after 1865.

These fluctuations in demand produced periods of "hard times" that became longer and more serious as the century advanced. There had been one just before 1870 when the price of wheat fell sharply. Another after 1875 was serious enough to produce government action, coinciding as it did with a widespread business depression, the decline in immigration and the movement of people out of the Province. It helped to encourage the shift to mixed farming and to more scientific methods of cultivation.

The agricultural depression that began in the late 1880's was more severe in many parts of the Province and lasted longer than the business depression that took place about the same time, for it was hardly over by 1895. In this area the farmers were less dependent on the overseas trade than on the local market. There had been some return to wheat-growing when prices improved after 1880. Acreage and production now declined although the yields per acre were much higher. The sudden ending of the demand for horses when street railways were

electrified brought a sharp drop in the number of horses produced in York County, but the demand for beef, pork, dairy products and vegetables in Toronto continued to grow greater. This affected the production of cheese which had never been as great in this area as in other parts of the Province. Production was still considerable in the mid-nineties but declined at the end of the century. The production of butter and of whole milk was growing; the raising of beef cattle was at least as important as dairying until after the end of the century. On the whole, agriculture had recovered by 1900 from the troubles that had affected it since 1870. These had left their mark on this area in spite of its special advantages.

CHAPTER 7

SINCE 1900

The opening of the twentieth century did not bring any great changes to Southern Ontario. The revived prosperity of the later 1890's continued through most of the next decade. In the towns there was expansion of certain more important industries, accompanied by a renewed growth of population. The same influences that had been causing the decline of the minor industries continued to operate. Carriage factories, flour mills and sawmills grew steadily fewer in the villages as the larger plants expanded, and with them disappeared the little hamlets of 50 to 100 people. The decline of the farming population continued, but more slowly. Farmers had recovered from the bad times of the nineties. Production was rising and markets for certain products were good until just before the First World War.

The northern part of York County was affected in much the same way as the rest of the Province, but the influence of the city, always important, was now felt more directly. The area was still far enough from Toronto to remain completely rural, but the connection was much closer than it had been before the building of the new railways. The electric railway in particular, with stops at short intervals, made it easy for the inhabitants to reach Toronto without the necessity of driving to a station. It tended to bring business into the towns, but hastened the decline of the country store. It was also bringing the city people into the country for recreation, but as yet this was found chiefly just outside the watershed -- on the shores of Lake Simcoe or near the small lakes to the south. Nor was there much tendency for people to live in the area and work in Toronto.

Both Newmarket and Aurora were growing rapidly during the years before 1911. Holland Landing, however, barely maintained its population, although the works on the Trent Valley Canal must have brought increased business for a time.

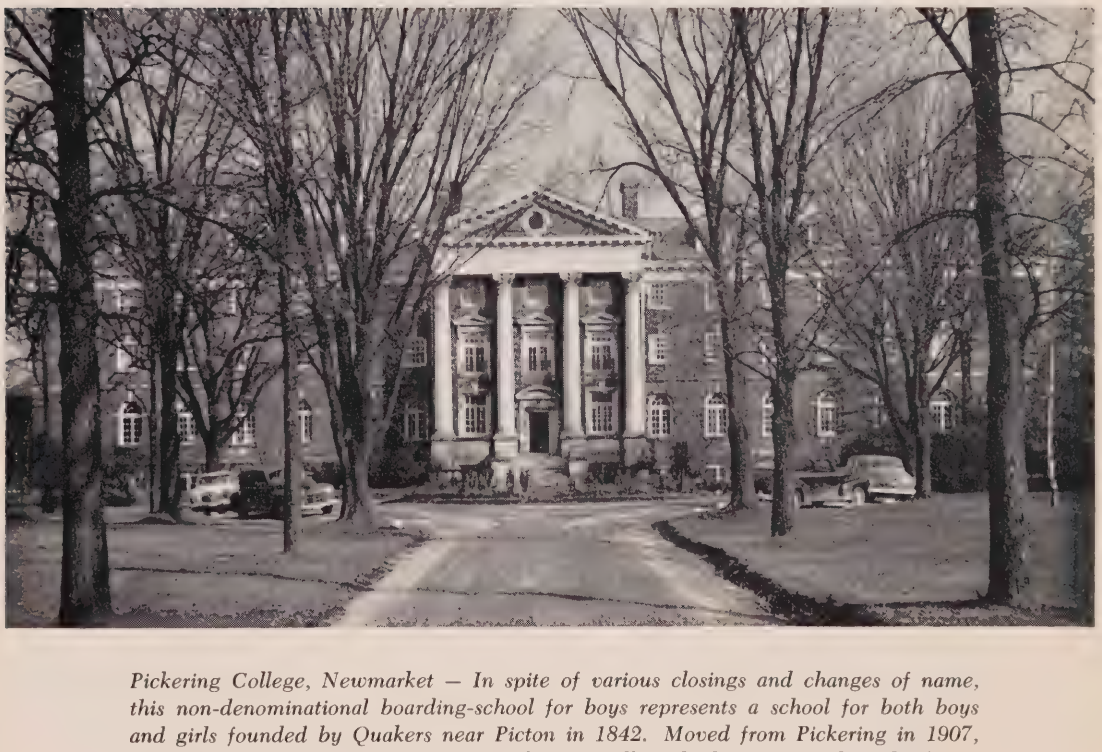
The Newmarket branch of this canal came at least fifty years too late. It might have been a useful work in the 1850's, when lumbering and wheat growing were at their height and there was only one railway line. In 1908 conditions hardly called for water transport to Lake Simcoe, even for passenger traffic. As the work was left unfinished its possible effect on the prosperity of Newmarket must remain conjectural, but it seems unlikely that it would have produced a more rapid development than actually took place.

Farming was at this time in a fairly prosperous state. The area was more than ever producing for the local market. Motor transport had hardly begun to be used, but where railway connections were good, this gave an advantage to the areas near the city. Toronto still required great numbers of horses and huge quantities of hay and grain to feed them.

The populations of the townships were still shrinking before the war, but less quickly than before 1900. The war probably increased this tendency for some years, and the shortage of farm help was serious. The motor car was already having some effect in the twenties and for about twenty years the rural population of the area remained about the same. In the source areas there may have been some loss, but there was sufficient increase in other sections to compensate for this.

Both Newmarket and Aurora had added considerably to their populations before 1921. The great development of motor traffic during and after the First World War was again making Yonge Street an artery of through traffic. This had a mixed effect on the towns, for though the paving of the roads brought more business from the country, it also brought the city nearer in time. Neither of the towns grew so rapidly during the boom years before 1930 as they had between 1911 and 1921.

The first brick building in Aurora. Doane Hall was the home of Charles Doane, a merchant, who was postmaster of "Whitchurch Post Office" by 1850 and first postmaster of Aurora. Built in 1846, the house was brought up to date about 1860 by the addition of a new cornice and possibly a doorway also. The stucco may date from this modernization.



Pickering College, Newmarket — In spite of various closings and changes of name, this non-denominational boarding-school for boys represents a school for both boys and girls founded by Quakers near Picton in 1842. Moved from Pickering in 1907, after a fire had destroyed the first Pickering College built in 1878, the school was reorganized in 1927 after being used as a hospital during and after the First World War.

Since 1911 Holland Landing had been growing steadily smaller. It was off the main line of traffic and now had no industry to speak of, and little importance as a market town. In the early twenties what little activity seemed to remain in the village centred around the railway station. The upper part seemed almost deserted, although the remaining houses were occupied and in reasonably good repair. They had been little altered and formed an interesting survival from the previous century. In 1933 Holland Landing ceased to be an organized village and became part of Gwillimbury East Township. In recent years there have been signs of a revival, due partly to the developments in the Holland marshes and partly to the opening of a factory. This development seems to be proceeding in a haphazard manner and is likely to destroy the character of the old village without producing anything satisfactory in its place. Without some careful planning Holland Landing seems in some danger of a different kind of deterioration from the decay that set in about 1860.

Similar problems are already beginning to affect other parts of the area. Although most of the watershed is still rural and the suburban area still distant, the gradual spread of the city into the country has become very noticeable, especially near Yonge Street. This tendency had begun by the thirties in spite of the depression which was affecting this area like the rest of the country. It continued during the Second World War, when the area was feeling the effects of increased production. The growing difficulty of finding housing in Toronto has certainly had a great deal to do with the rapid growth of Aurora since 1941 and has influenced that of Newmarket also. It is now beginning to affect the townships as well. All have made marked gains in populations since 1941.

The movement began with an increase in the population of the towns. In the country it was at first largely a matter of periodical residence for recreation, but

as winter travel becomes easier, permanent residence is growing more common. The area is not likely to become suburban in the old sense, but if the spread of population and the decentralization of industry continue, these urban developments will grow steadily greater. A careful planning of every sort of land use is essential if mistakes are to be avoided that will cause difficulty in the future.

LAND

CHAPTER 1

GENERAL CONSIDERATIONS

1. The Purpose of the Survey

A soil conservation survey is made in order to compile an inventory of soil resources and present use and to appraise the capability of the land. From this inventory and appraisal there can be derived a pattern of land use which, if carried out, would adjust the land more nearly to its capabilities. In this report a map of recommended land use has been prepared. This is based on the observations made in the field survey.

2. Methods of Survey

The soil maps of York County prepared by the Ontario Soil Survey formed the basis of the soil conservation survey. In addition, the soil types as described on the map were correlated with the landforms by field observation. All soil and land use mapping was done using aerial photographs with a scale of one inch to 1,000 feet, and using topographic maps with a scale of one inch to one mile. Field work was done from a vehicle traversing all roads and accessible lanes. All farms and most fields of the watershed were crossed on foot.

The mapping of the watershed was done on a reconnaissance scale. The soil type and landform were determined by observation and the land was then assigned to a certain class, depending on the degree of slope, amount of apparent erosion, present use and other soil conditions. When complete, all land in the watershed had been classified according to the conservation practices required to prevent or substantially reduce further soil erosion and water loss and to keep the land in a high state of productivity. It must be remembered that the land classes designated on the accompanying maps refer to general areas, not to specific

farms. Each class may include small areas of other classes which were too small to be shown on the scale of the final map. Where a certain land class is shown it means that that particular class is dominant in the area.

3. Definition of Soil

The soil is a living body. It is composed of unconsolidated mineral material, living organisms and the remains of dead plants and animals. It is formed by the interaction of living things on and within the soil, and of air and water with the mineral material. The soil provides the medium for the germination and growth of the plants that man uses. The quality of a soil is measured in terms of its capability to support the crops that man wishes to grow on it.

Each soil has its own properties and characteristics which can be observed and measured and according to which it can be identified and classified. A vertical cross-section of soil reveals levels with different physical, chemical and biological characteristics. These levels are called "horizons". The complete section is called a "soil profile". A soil is described in terms of the number, size, arrangement and properties of the horizons in its profile.

The soils in Southern Ontario were formed under a vegetative cover of hardwoods and mixed forest on glacial drift in a cool moist climate. The greatest effect of weather has been the surplus water which percolated downwards through the soil. The chief effect of the native vegetation has been, in the microbial decomposition of leaves and wood, the production of acids which are washed downward by the surplus water. The combination of the effect of vegetation and weather on the soil is called "podzolization". Resisting this action to some extent are the lime and magnesium carbonates found to a greater or lesser extent in the mineral material.

The soil-forming process produces a profile which, in general, conforms to the following description given in tabular form:-

Designation of Horizon	Description	Names
A o	Decomposed organic material (found only in soils undisturbed by cultivation)	Leaf mould humus
A 1	Decomposed organic material and microbes mixed with mineral matter (clay, sand etc.). Black or dark brown in colour, friable or crumbly in structure.	Topsoil, the melanized horizon
A 2	Mineral material with finer particles (colloids) and basic compounds (iron, calcium etc.) leached out. Powdery, pale yellow or gray in colour.	Zone of leaching considered part of topsoil
B	Reddish brown in colour, nut-structured or crumbly, heavier in texture than topsoil and usually heavier than lower horizons, has some free carbonates only at the bottom, higher proportion of colloids and iron. In soils of inferior drainage the brownish colour is mottled with gray.	Zone of accumulation, commonly called subsoil. (This is the bottom of the weathered soil)
C	Clay, silt, sand or loam may be stony, unweathered and lacking in special properties of higher horizons. Free carbonates may be present. There is no accumulation of iron so that colour is more gray than brown.	Parent material. (Roots may penetrate this horizon and draw water and mineral materials from it)

Variations from this idealized virgin profile are commonly found. The two main factors which affect profile development are parent material and soil climate (which depends on internal soil drainage).

Soils developed on coarse, open material such as sand or gravel usually have deeper profiles because the water is able to move downward more freely. The process of podzolization leaches lime out of the soil but if there is a high concentration of lime in the parent material, this process is opposed and the profile is more shallow. Excessively drained materials allow greater aeration and the resulting oxidation reduces the amount of humus; conversely, inadequately

drained soils tend to have a higher proportion of surface horizon with high organic content.

The soil-building processes are going on all the time. Normal erosion occurs on the surface and the profile is maintained by continued weathering of the parent material. When the soil-building process has been long continued, the optimum profile will have been developed and the soil is considered to be mature. Soil building and erosion will be in equilibrium. When erosion occurs at a faster rate than soil is built, as in soils exposed to cultivation, "accelerated erosion" is said to be taking place. This is the erosion (in the form of sheet, gully or wind erosion) which is the concern of the conservationist.

When a soil is inadequately drained or has a fluctuating water table near the surface the soil-building process, which is due mainly to the downward movement of water and the aeration of the soil, is restricted. Profiles of the soil are then shallower. When the water table fluctuates, the subsoil is mottled gray and brown. If the water table is permanently high, the subsoil is gray. In either of these cases a subsoil is formed that is very sticky due to the concentration of colloidal material. This kind of subsoil is called "glei".

4. Soil Classification

The soils of Ontario can be grouped into catenas (or associations), series, types and phases. Soils that are formed on the same parent material in the same landform belong to the same catena. Within one catena of soils there are different series as the result of different balances of the various soil-building forces. The main factor in soil building is moisture, so that the soils in an association may be classed according to natural internal drainage. Four degrees of drainage are recognized in this report:-

Excessively drained	- Deep profile with faint development on low organic content in the topsoil.
Well drained	- Optimum profile development.
Imperfectly drained	- Lower horizons shallower, different development.
Poorly drained	- Poor profile development, deep organic horizon.

Soils developed on the same material and having similar profiles belong to the same "series". Thus, in one catena, there may be three or more series of soils corresponding to the drainage classes outlined above.

The series found in one catena carry their own names. It is sometimes convenient to apply the name to the series with good drainage and optimum profile develepment, and to refer to the others as the "imperfectly drained" and "poorly drained" associates of the first series. When to the name of a series is added a textural class - as "loam", "clay loam" or "sandy loam" - a "soil type" is identified. Thus Schomberg silt loam is found on the watershed.

The textural classes mentioned above refer to the size of particles. The finest particles are clay, the coarsest are gravel, and textures are graded as clay, silt, sand or gravel - a mixture of these is called loam. Clay with a small admixture of other separates is called a "clay loam"; "sandy loam" and "silty loam" are also found. The textural class is largely determined by the nature of the parent material, so that all the series in one association may have the same textural designation. Clay loam and silt loam types may be found in one series.

5. <u>Erosion</u>

Reference has already been made to "normal" soil erosion which is a natural process, and to "accelerated" erosion which may be induced by "outside" influences such as agriculture. Erosion may often be readily recognized by

gullies, topsoil piling up along fence lines and so on. More often the process is more insidious and not easily recognized except by direct field examination of the soil.

In a soil conservation survey, it is necessary to estimate and classify the degree of erosion and the steepness of slopes. The following slope classes, adopted and modified from the United States Soil Conservation Service, were used in the survey:-

Smooth, Regular Slopes

Per Cent	Mapping Symbol
0 - 2	A
2 - 5	B
5- 10	C
10-15	D
Over 15	E

Hummocky, Irregular Slopes

Per Cent	Mapping Symbol
0 - 7	M
7- 15	N
15-25	P
over 25	R

In topography with regular slopes, land is considered to be level when the slope is under 2 per cent, and usually requires no special management, unless the internal soil drainage is impeded. All other slope classes require special practices to control erosion and to conserve water.

The estimated degrees of erosion that were recognized are as follows:

Estimated Degree of Erosion	Mapping Symbol
No apparent erosion	0
Into topsoil (A horizon)	1
Into subsoil (B horizon)	3
Into parent material (C horizon)	5

6. Method of Defining Erosion

In the field survey soil conditions were noted in a number of ways. Roadcuts and excavations were examined where necessary. More frequent examination of soil conditions was done by using a three-foot soil auger which could penetrate to depth and bring up soil samples. Where applicable a soil

spade was also used. Depth of parent material and its position with relation to the surface was determined by using a dilute solution of hydrochloric acid. The free carbonates of the limy materials effervesce in contact with the acid. The upper horizons are usually lime-free and do not normally provide a reaction. Slope was determined by the use of an Abney Level.

In the mapping of soils and estimation of the degree of erosion an examination of virgin soils in old woodlots and along fence lines is first made. These profiles form the yardstick against which other profiles are measured and it is thus a relatively simple matter to estimate how much of the soil in a given site has been lost by erosion. Crop response often reveals erosion and it is a common thing to see a poor response on eroded slopes due to lack of moisture in eroded materials. Soil colour may frequently provide a check on erosion and profile depth.

The establishment of boundaries between types of soil or soil conditions is rather more difficult than establishing the existence of the type or condition. Usually these features merge into each other and form a transition zone. Sharp topographic breaks, or vegetative response due to poor drainage or some other cause, may often help to establish the boundary with accuracy.

CHAPTER 2

SOILS OF THE WATERSHED

The following soil types, indicated on the Soil Map of York County as prepared by the Ontario Agricultural College and Dominion Department of Agriculture, are found on the Holland Watershed.

(1) Pontypool sand
(2) Brighton sand
(3) Brighton sandy loam
(4) Bridgman sand
(5) Rubicon sand
(6) Tecumseth sand
(7) Granby sandy loam
(8) Percy fine sandy loam
(9) Milliken sandy loam
(10) Milliken loam
(11) Lyons loam
(12) Bondhead loam
(13) Kettleby loam
(14) Simcoe silt loam
(15) Simcoe clay
(16) Schomberg silt loam
(17) Muck and Marsh
(18) Bottom Land

(1) Pontypool Sand

This soil is found in the moraine in a narrow belt running east-west from Vandorf, and in the section to the west of Armitage. A large portion of it is in woodlot or pasture. Its agricultural use is limited by steep slopes, low organic content, erosion and low moisture-holding capacity. Due to its permeable nature, surface run-off is low and the valleys have no permanent streams. The sands and gravels which compose this soil are roughly stratified.

The soil profile is variable but quite deep, often extending three feet or more, because the material is so permeable. The topsoil is a brownish sandy loam shading to a grayish-yellow dusty sand in A2 horizon. The B horizon is brown and compact, shading into the grayish-coloured sandy parent material. The chemical reaction is nearly neutral because of the lime content of the parent material. The original forest cover was probably mixed hardwood and coniferous. Gravel pits are found in this soil.

(2) Brighton Sand

This soil is found mainly in the area to the west of Ballantrae, with smaller areas being located north of Holland Landing and south of Aurora. This soil is heavily wooded, both natural and reforestation, with the bulk of other land use being pasture. Erosion, low organic content and drought severely limit its use for agriculture.

These materials, as with the Pontypool, are glacial outwash but they are more finely sorted and less stony. They are fairly high in lime and often contain small deposits of marl. Streams are few but where they do occur dissection is fairly pronounced.

The profile is variable but generally not as deep as the Pontypool. The topsoil is brown, shading into pale yellow in the A2 horizon. The B horizon is a darker yellow shading into a compact reddish-brown level which is heavier than either the topsoil or parent material. This soil has suffered severely from erosion in the past. Some sections have apparently never been fully cleared. The reforestation project of the Vivian Forest is located on this soil and extensive areas of conifers have been planted.

(3) Brighton Sandy Loam

The surface relief and moisture relationships are less severe than in the Brighton sand. There is a better

balance of organic material and the soil is more loamy. Woodlots are few but some reforestation has been carried out in one or two places. The soil carries all crops common to the area. Some potatoes are grown. Erosion is not generally a problem.

The profile is generally about two and a half feet in depth with the brown sandy loam topsoil grading into a yellow sandy loam A2. The fairly compact brown loam of the B horizon overlies a gray sand parent material high in lime. There are very few stones.

(4) Bridgman Sand

This series is the excessively drained associate of the Brighton, or represents a severely eroded phase of it. It is a loose pale yellow and gray sand, excessively drained and subject to further erosion. These areas are being reforested.

(5) Rubicon Sand

Small sections of this soil are found to the north of Holland Landing. Land use is limited chiefly to pasture and hay with the bulk of it being in trees. The topography is quite flat and drainage is somewhat inhibited.

The profile is one of a yellowish-brown sand topsoil over an ashy-gray powdery A2. The B horizon is a reddish-brown sandy loam containing more compact reddish lumps. The parent material is a somewhat limy mottled gray sand.

(6) Tecumseth Sand

This is found in association with the Brighton, only in very small sections near Vandorf and Musselman Lake. Trees form much of the land use due to the restricting factor of poor drainage. Erosion is not a problem. The soil has a fair proportion of free carbonates.

The profile is stone-free with a dark gray sandy loam topsoil lying over yellow sand which grades into a mottled gray sand with some silts. The topography is nearly level.

(7) Granby Sandy Loam

Found only in a small section to the north-west of Holland Landing, this soil suffers from poor drainage. Its use is restricted to trees. The topography is nearly level and the material is alkaline in reaction.

The profile is stone-free with a dark gray sandy loam over gray or mottled sand. Clay is found at a depth of three feet or more and is a factor in the poor drainage.

(8) Percy Fine Sandy Loam

On the Holland this type occurs in sections near Vandorf, north of Wesley Corners and to the east of Sharon. Found occasionally as a relatively thin veneer over heavier silts and clays, it is largely cleared and crops are those common to the area. Except on the steeper slopes and more hummocky areas erosion is not a serious problem. The very slightly inferior drainage in some places, due to the heavier subsoil, may be regarded as an advantage.

The profile is fairly well developed with the brown fine sandy loam topsoil being over a yellow sandy loam A2. The heavier brown loamy B overlies a parent material of gray fine sands or silt, or occasionally clay.

(9) Milliken Sandy Loam

The watershed encloses only a very small portion of this type along the south-east border, adjacent to the Pontypool Sands. Land use is devoted to the usual crops but a coarse, open texture, droughtiness and lower inherent fertility reduce its value as agricultural land. The topography is rolling to hilly, and erosion may be severe,

particularly on the steeper slopes. The poorest lands are generally in woodlot.

This soil is part of the Interlobate Moraine. It is a light till, loamy, with finer particles of clay lacking in the topsoil, hence its classification as a sandy loam. The topsoil is similar to that of Pontypool sand but there is a heavier subsoil similar to Milliken Loam. The parent material is not stratified, even roughly as in the Pontypool.

(10) Milliken Loam

Only around Lake Reesor (Preston Lake) is this type found. Most of the area of this soil is in farmland and it carries the usual crops common to the area. The surface relief is undulating to rolling. The deeper hollows are commonly poorly drained and devoted to trees while the slopes are subject to erosion.

The material is a medium-textured calcareous glacial till. It is a loam and includes clay, silt and sand. It contains many small stones and few boulders.

The soil profile is a good example of a gray-brown forest soil, developed on a medium-textured calcareous till. The topsoil is a light brown loam, crumbly and easy to work, and the few stones present no problem. The subsoil has a rich brown colour and a characteristic nut structure. Undisturbed the material cleaves, when dry, into clods about the size of walnuts. This structure and its medium texture allow aeration and free percolation so that the weathering processes have carried the profile downward two and a half feet or more.

(11) Lyons Loam

Small in area on the watershed and not well represented, Lyons Loam consists of some six to ten inches of black, stony loam overlying a stony grayish-brown mottled glei. The soil is poorly drained, the topography is nearly

level, and the soil reaction is mildly alkaline due to the lime content. Its characteristics make it generally unfit for agriculture. Pasture and woodlot are the best uses.

(12) Bondhead Loam

Found in the areas surrounding Queensville and to the west of Newmarket, this soil is a typical medium-textured till common to the drumlin fields. Commonly a good agricultural soil, it has suffered in both the above-named areas by severe dissection. Severe erosion is a problem on the steeper slopes, and the normal agricultural pursuits of the watershed are only possible on the lesser ones. In some cases the longer smoother slopes may be adaptable to contour farming methods. Many of the steeper slopes have been left in trees or pasture.

The profile is fairly well developed with a topsoil of brown loam over an A2 horizon of light brown loam. The B horizon is darker and more compact while the parent material is a gray calcareous stony loam. Stoniness is not a problem and drainage is good except in hollows.

(13) Kettleby Loam

Similar to the Milliken, this type is found in the west and south-west portion of the watershed. Except where the land is sharply dissected it forms a good agricultural soil. The steeper slopes are often in trees and pasture and where used for crops the erosion is serious. Stones and boulders do not present a serious problem but are fairly common. Drainage is good. Long smooth slopes are not as common as on the Bondhead and contour methods of agriculture are not so often possible.

This soil is also a medium-textured till with the brownish loam topsoil overlying a light brown loam A2 horizon. The B horizon is a reddish clay loam over a calcareous stony limestone and shale till. The profile is fairly well developed and about two feet in depth.

(14) Simcoe Silt Loam

The soil mapped as Simcoe silt is found in the agricultural part of the Queensville Flats. It is lacustrine in origin and is composed of sand and silt materials with small proportions of clay. There is probably more sand than silt, and lenses of pure sand are common. The profile is stone-free and exhibits a dark gray silt loam over calcareous mottled grayish silts. The poor drainage has been relieved by the construction of drainage ditches but even with this the soil tends to be a cold one. Erosion is not a problem.

(15) Simcoe Clay

Only a small portion of this soil has been mapped in the area north of Queensville. Also of lacustrine origin, it is stone-free and poorly drained. The profile of dark gray clay and silty clay over mottled grayish silts and clays is not well developed. The topography is level and erosion is not a problem.

(16) Schomberg Silt Loam

This type is found in the main central valley of the Holland. It is quite extensive in area and gives an indication of the former extent of the Holland area of Lake Algonquin. With an undulating and rolling topography and good drainage, this is one of the better agricultural soils of the watershed. Rather severely dissected in many places by the present surface drainage, it has many erosion problems which can only be overcome by wise land use. In the roughest areas the land is often devoted to trees or pasture.

The profile is shallow, frequently being little more than a foot in depth. Dark gray silt loam and gray loam are over a grayish loam and silt loam. The parent material is quite calcareous with a few stones. In some places the materials tend to be somewhat more clayey.

(17) Muck and Marsh

These types are found in the most poorly drained sections of the watershed where the ever-present high water table so retards bacterial action that the decomposition of organic material is very slow. Under these conditions it tends to accumulate. These soils are normally used for summer pasture, marsh hay and trees. Only at great expense and under extremely intensive practices can the larger areas be used for specialized market garden crops.

(18) Bottom Land

Ordinarily having no profile development, this type is found in the valley bottoms of the larger streams and tributaries. Being subject to periodic flooding they are little used, except in the most favoured locations, for regular agriculture. Their best use generally is in trees or pasture. The material composition of this land type is varied, ranging through clay, silt, sand and gravel. Poor drainage is usual.

CHAPTER 3

PRESENT LAND USE

1. Introduction

Although the land use of the Holland area is devoted primarily to mixed farming, there are other major uses which tend to make it distinct from most other agricultural areas in Southern Ontario. Urbanization, reforestation, recreation, horticulture and other land uses help to give special character to the region. The physical character of the land and its soils has been a major influence in helping to determine these land uses. From a period when any and all soils were used for general farming, the trend has been, by trial and error methods, towards specialization.

The following types of present land use, with proportion in each use, were recorded:

Land Use		Approximate % of Area
Woodlot	(a) natural woodlot	14
	(b) reforested lands	4
Grain	(a) spring grain	21
	(b) winter grain	7
Hay		17
Permanent pasture		17
Hoe crops (corn, roots, etc.)		3
Fallow land		2
Orchards and market gardening		1
Water (ponds and lakes)		1
Idle		5
Urban		5
Non-urban built-up lands (including lands devoted to farm buildings, schools and so on)		3

2. Urban Land

While agriculture is the dominant land use, urbanization has increased, particularly in the last few years. Newmarket and Aurora are the main urban areas, with

smaller ones being located at Holland Landing, Sharon and Queensville. The first two mentioned, in addition to being market towns, have a well defined industrial base. The main river itself is important to the larger centres, and others in the two rather conflicting interests of recreation and sewage disposal. In the survey of present land use, all the area completely built up was classed as urban with no further description, as such land is beyond the scope of the soil conservation program.

There is one matter of urban use, however, that should be mentioned. The area is becoming increasingly a part of the Toronto rural-urban fringe where people living in the area work in the city. This is particularly true of the main Holland Valley and less so of the eastern portion. Many of these people live in the towns and villages but an increasing number have bought building lots, small estates and farms outside of these areas. By so doing they not only disturb but often radically change the former agricultural land use pattern. Frequently these changes in land use are beneficial from the aspect of conservation. Lands that were marginal for general agriculture as practised in the watershed are often reforested or placed under a permanent sod cover by the new owners, who are not under economic pressure to make every acre produce a maximum of field crops. Except where lands have been built and are classed as urban, these changes in use have been surveyed and are considered in connection with the other agricultural and forested lands of the watershed.

3. Recreational Land

Generally speaking, the land requirements of the major recreation areas do not conflict with agricultural requirements. By and large the needs of the former are those of waters suitable to swimming, boating and perhaps fishing. The rough lands of the Preston's Lake and Musselman Lake areas fit these needs admirably. Exceptions are places like

Newmarket and River Drive Park where these water requirements are not met due to river pollution by upstream industry, residential and other uses. These features are discussed in other sections of this report.

4. Forestry

Woodlots, pastured, not pastured and reforested, comprise an important acreage in the watershed. In most cases they are located on the roughest lands and the poorest soils. A description of the extent, types and conditions of forested land is given in the Forestry section of this report.

5. Agriculture

Although the above uses cover a considerable portion of the watershed and are to a greater or lesser extent intimately concerned with soil and water conservation, it is on the larger farm area where the needs and problems are greatest. In the former there is either no concern or the most drastic measures, applicable to the condition, have already been taken. On the present farm lands these drastic measures are not always necessary but the condition should be recognized and the correct steps taken to cope with it.

The watershed area is within the Toronto milkshed and most farms are devoted to supplying the city with fluid milk. The area is well supplied with roads and highways and daily milk collection is an easy matter. Although many farms are almost wholly concerned with fluid milk production and the maintenance of the milking herd, many farmers find supplementary sources of income in hogs and sheep, and to a much lesser extent poultry. In the rougher lands of the moraine, some beef cattle are pastured. The severe erosion found on many fields is masked by the fair to good crops being obtained by the heavy use of organic and commercial fertilizers.

(a) Pasture

This class includes bottom lands, rough lands and all other improved and unimproved grass lands which were in permanent pasture and do not normally enter into the crop rotations.

(b) Grain, Hay and Hoe Crops

These normally enter the farm crop rotation. Also included are the odd field or part-field of potatoes which may or may not be a normal crop on those farms. They are a cash crop.

In reviewing land use these uses are differentiated. Cultivation for grain exposes land to erosion and, except for the stubble ploughed in, it extracts fertility from the soil. Spring grain is the largest single use recorded and is three times that of winter grain (chiefly fall wheat). Grass and legume mixtures for hay and pasture, once established in sod, protect soil from erosion. Sod is to some extent a soil-builder because it returns some organic matter to the soil. Only 17 per cent of the land is under sod in rotation.

Hoe crops, under clean cultivation, offer little protection against soil erosion. Every inter-row furrow is a potential watercourse and open to gullying. In addition, these crops offer little return of organic material to the soil; they are heavy users of water and of mineral nutrients. Corn represents the greater part of this use which covers 3 per cent of the watershed.

(c) Horticulture

Orchards and market gardens were separated from ordinary farmland use. They are small in area and operate under a very intensive practice. Heavy users of soil fertility, they often require organic supplies from other farms. Examples of this use were few and scattered; Holland Landing, Musselman Lake and Aurora were the main locations.

6. Present Land Use Compared to Recommended Land Use

A record was kept of land use (at the time of the survey) on aerial photographs and could thus be related to soil type and conditions or to the use recommended for each unit area. As will be seen, in no instance is a major change in land use recommended.

Spring grains require preparation of the soil in the fall and this exposes land to erosion and water loss during critical seasons - late autumn, late winter and early spring. A change in emphasis from grain to grass and legumes would correct this situation. With greater emphasis on fodder crops (hay, dried and chopped hay and grass and legume silage) this can be expected to take place. Although this is dictated by consideration of economic, labour and machinery conditions, it is all to the good from the point of view of soil conservation. It is suggested that, as consideration is given to this shift in land use, the conservation aspect be taken into account along with other factors, particularly on sloping and erosible land.

CHAPTER 4

CONSERVATION PRACTICES

1. Introduction

The aim of soil conservation is to use and manage every acre according to its capability, so that the level of agricultural production is maintained or raised and so that the best use is made of the available moisture.

Most of the area of the watershed is farmland and likely to remain in farms. Soil conservation is the job of the farmer and any measures to be undertaken beyond those already in effect will be carried out by the farmer, both for his own benefit and for the whole community. This chapter describes things to be done on the land to increase and sustain production and to use to best advantage the water resources of the watershed.

Not all of these measures may be applicable to any one farm, but some of them will be applicable to all farms. While the planning of some farms will require major changes, many will require only the adoption of special practices on some of the land. On many farms some of these practices are already being carried out.

2. Permanent Pasture, Cover Crops and Crop Rotations

A good deal of the erosion takes place in spring and fall when the land is left bare for varying lengths of time. Fallowing land over summer or winter, though perhaps necessary, increases erosion, water loss and leaching out of fertility. It is therefore necessary to provide a cover crop as much of the time as possible, or leave the fields in as rough a condition as possible.

In the case of permanent pasture the sod cover is provided. The main requirement then is to keep the pasture in good shape and ensure that overcropping does not occur. By application of commercial fertilizer, top dressings of

manure and the cutting of weeds, favourable pasture growth may be ensured. Most of the pasture land existing appears to have little done to it to provide optimum return. Ordinarily it is located on the least favoured section of the farm and is neglected. There is no reason why, under better management, these lands could not provide two or three times the return they now provide. Pasture also helps to stop erosion on steeper slopes, provides a better use of the lighter soils, and aids in maintaining organic content and thus water-holding capacity.

Crops such as the grains and row crops (mainly corn and potatoes) for a portion of the growing season provide little soil protection. In addition they are heavy users of mineral nutrients and their continued cultivation leads to decline of the organic content of the soil. It is therefore necessary that this loss be replaced. This may be done by applications of commercial fertilizer and manure and by the ploughing in as much as possible of crop residues. The legumes, the soil-builders, are particularly valuable in this respect. They not only provide organic material but also provide a natural source of nitrogen which is essential in the bacteriological decomposition of all materials ploughed in, and under the normal rotation it may be desirable to extend the rotation year periods. The better soil structure and higher organic content built up in this time will materially reduce erosion and also provide better yields of subsequent field crops.

When land is left in the ploughed condition it should be in as rough a state as possible to reduce surface water flow. An early sown cover crop such as fall rye will not only help to reduce erosion but will also be a further source of organic material to be ploughed under in the spring. Stubble mulching is already a common practice.

Conservation Measures. Drill rows on the contour and a buffer strip of grass on the steepest slope help to control erosion.

Haymaking Scene. A predominance of grass and legume cover in the rotation is the chief conservation measure on this type of land.

3. Grassed Waterways

Many of the gullies observed on the watershed could have been stopped by the use of grassed waterways. Many more are likely to develop unless suitable protection is given. Water flowing in cultivated waterways has nothing to stop it from downcutting and eventually taking that portion of the field out of use. Grassed waterways not only provide a valuable source of hay if left wide enough to cut, but they also help to deliver cleaner water to the streams by filtering out the suspended soil particles in the grass. The grasses used should be those which will form a thick mat and will lie flat under running water.

4. Contour Cultivation and Strip-Cropping

Only a small portion of the watershed as a whole was deemed suitable for contour cultivation, but there are many farms where such methods would prove valuable on individual fields. Where cultivation takes place up and down the slope erosion is aggravated. Even though the rills so formed are small and are obliterated by subsequent cultivation, much soil is lost. By cultivation on the contour erosion is much reduced and each furrow or drill-row acts as a dam and so assists the penetration of water. On gentle slopes contour cultivation may be sufficient, but on steeper slopes strip-cropping should also be used. The width of the strips should vary with the steepness of the slopes.

5. Gullies

In the course of the field survey work all gullies seen were examined. The condition of 69 gullies was recorded. Only those of a sufficiently large size to prohibit general cultivation were examined.

In all but three no water flow was recorded at the time of the survey. The apparent cause for these gullies

varied, but in the majority of cases unprotected waterways was the main reason. Not infrequently gullies were located on the fenceline. Gullies occurring on steep slopes were taken as evidence of overgrazing of these pastured lands. In several cases cow paths had begun the gullying. Most gullies were located on the heavier soils of the watershed.

Remedial measures taken to stop these gullies were generally nil or ineffective. Remedial measures in 21 gullies consisted of partially filling the hole with stones or junk. In 7 cases some vegetative cover (in most cases weeds) was provided, but in only one of these were adequate measures taken. The others had not been in effect a sufficient length of time to give control. In the other 41 cases no remedial measures had been undertaken at all and headward erosion in them was proceeding apace. For the most part gully walls and bottoms were bare.

In only 5 cases were the remedial measures apparently adequate, partially effective in 4 and totally ineffective in the balance. Garbage and trash is ineffective in gully control and is an eyesore.

These gullies, and others unrecorded, constitute a serious threat to the farms on which they are located. Where they are not controlled the condition gets worse and with increasing size branching may develop. As their size increases they take more land out of production, are a hazard to stock and make cultivation difficult.

Gullies may be controlled by various means:

(1) Sod cover

(2) Check dams

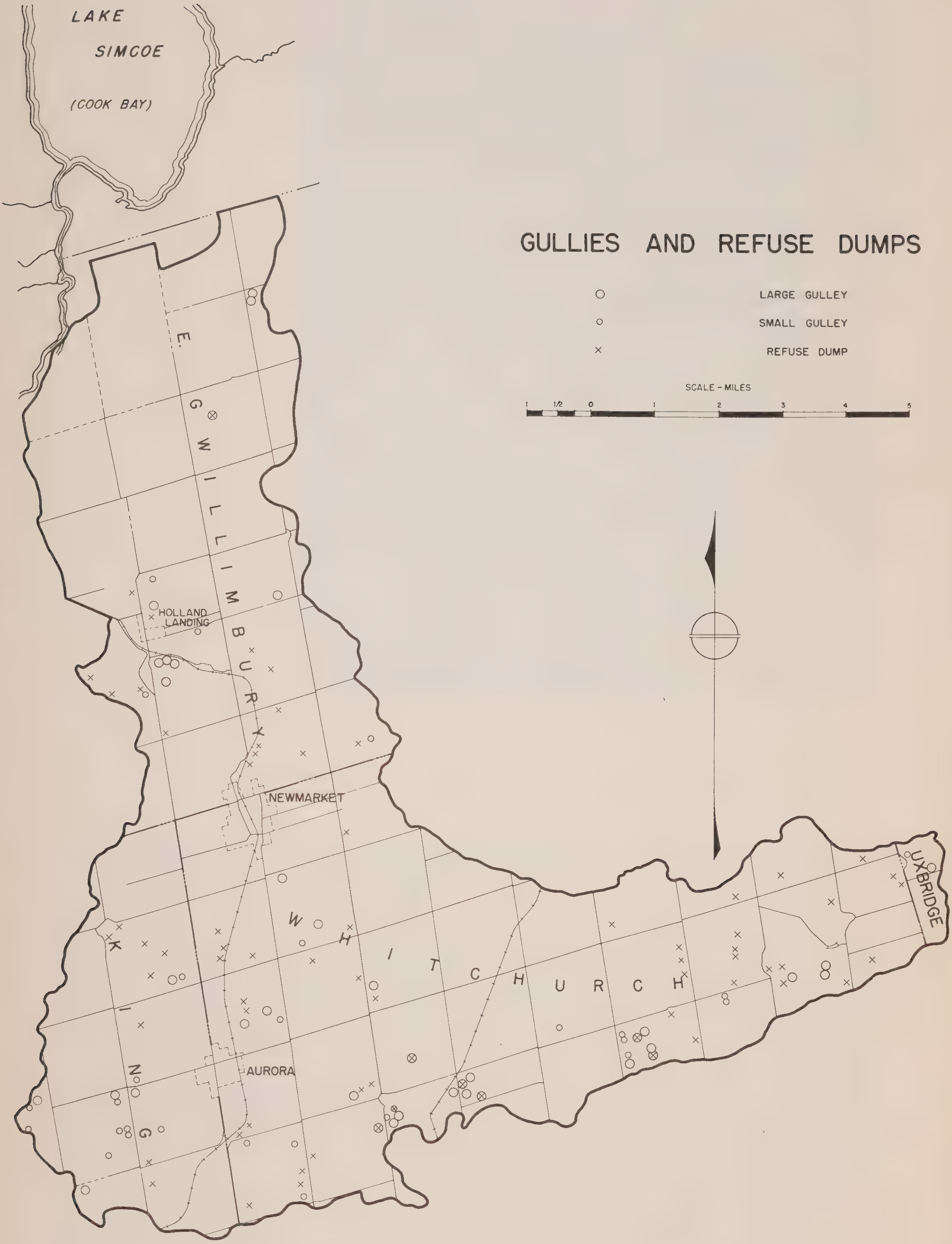
(3) Grading and filling, covered by sod or trees

(4) Tree and shrub cover

(5) Intercepting till drains or diversion terraces

(6) Tile drains along the gully, back-filled

(7) Filling with brush or straw to slow movement of water and build up sediment


GULLIES AND REFUSE DUMPS
LARGE GULLEY
SMALL GULLEY
REFUSE DUMP
SCALE - MILES
1 1/2 0 1 2 3 4 5
LAKE
SIMCOE
(COOK BAY)
E. GWILLIMBURY
HOLLAND LANDING
NEWMARKET
WHITCHURCH
KING
AURORA
UXBRIDGE

Gully Erosion. The head of this watercourse in the grain field is protected by grass, but the neglect in the old pasture can lead to serious trouble. Piling trash is no cure for a gully, but it could be regraded with gentle slopes kept in permanent grass and steeper slopes under trees or shrubs.

Gravel Pit. Abandoned gravel pits can be ugly scars and the cause of serious erosion. Reforestation on the slopes and shrub cover on the gravel can protect these areas.

6. Blowouts

Blowouts are a feature of wind erosion in sandy soils but may have their origin in water erosion. They represent an advanced stage of erosion and are difficult to deal with. On the Holland these are found almost entirely in the Brighton and Pontypool Sands of the eastern portion of the watershed. Due originally to improper methods of land use, they have been, or are now becoming, stabilized by reforestation. Most of the occurrences are now within the Vivian Forest area and with but few exceptions are no longer a serious problem.

7. Diversion Terraces

A diversion terrace is a broad ditch with gently sloping sides running only slightly off contour. It directs run-off to flow across a slope and delivers it to a grassed waterway or other harmless outlet. This device is particularly useful on slopes that are ordinarily not suitable for contour cultivation.

As with contour cultivation and strip-cropping, it is advisable that the installation be under the supervision of a trained agricultural engineer or soil conservationist. Faulty layouts may be ineffective and lead to trouble that could have been prevented by correct installation.

8. Woodlot Management and Reforestation

These are discussed fully in the Forestry section of this report. Reforestation of suitable lands and management of existing woodlots are important parts of the farm and watershed conservation program. The loss of pasture by the exclusion of cattle from the woodlots (essential in a woodlot program) can be more than offset by the establishment of long-term improved pasture or the provision of temporary summer pastures. Shade for the animals may be provided by

Run-Off Pond. Water is pumped from this pond to the barn. The sod cover on the emergency overflow spillway has not proven quite adequate to protect it from erosion.

leaving a few trees outside of the woodlot fence, by the establishment of windbreaks or by single trees.

9. Farm Ponds

Many areas on the watershed are suitable for the installation of farm ponds. Possible sites are spring-line locations, of which there are many, permanent streams, seepage areas and watercourses. Even where the flow is not permanent there may be enough spring meltwater and summer rain to provide a near permanent source of water for fire protection, stock-watering and other uses.

All of the types described in the Holland Valley Conservation Authority booklet on Farm Ponds (readily available to those wishing one) might be used on the Holland. There are six types:

(1) dug-out
(2) spring-fed,
(3) by-pass,
(4) run-off,
(5) permanent stream dams,
(6) temporary dams on permanent streams.

Of these types two dug-out, two spring-fed, eleven run-off and eight permanent stream ponds were found and examined on the watershed. The remnants of innumerable other permanent stream dams were seen. In very many cases these dams were constructed without much thought to the watershed area behind the dam. All dams must be constructed with due regard for the maximum volume anticipated and an adequate emergency spillway should be provided to take care of excess flow.

In most cases the ponds are left open for stock-watering purposes. This leads to bank trampling and increased sedimentation. To reduce pond maintenance and to

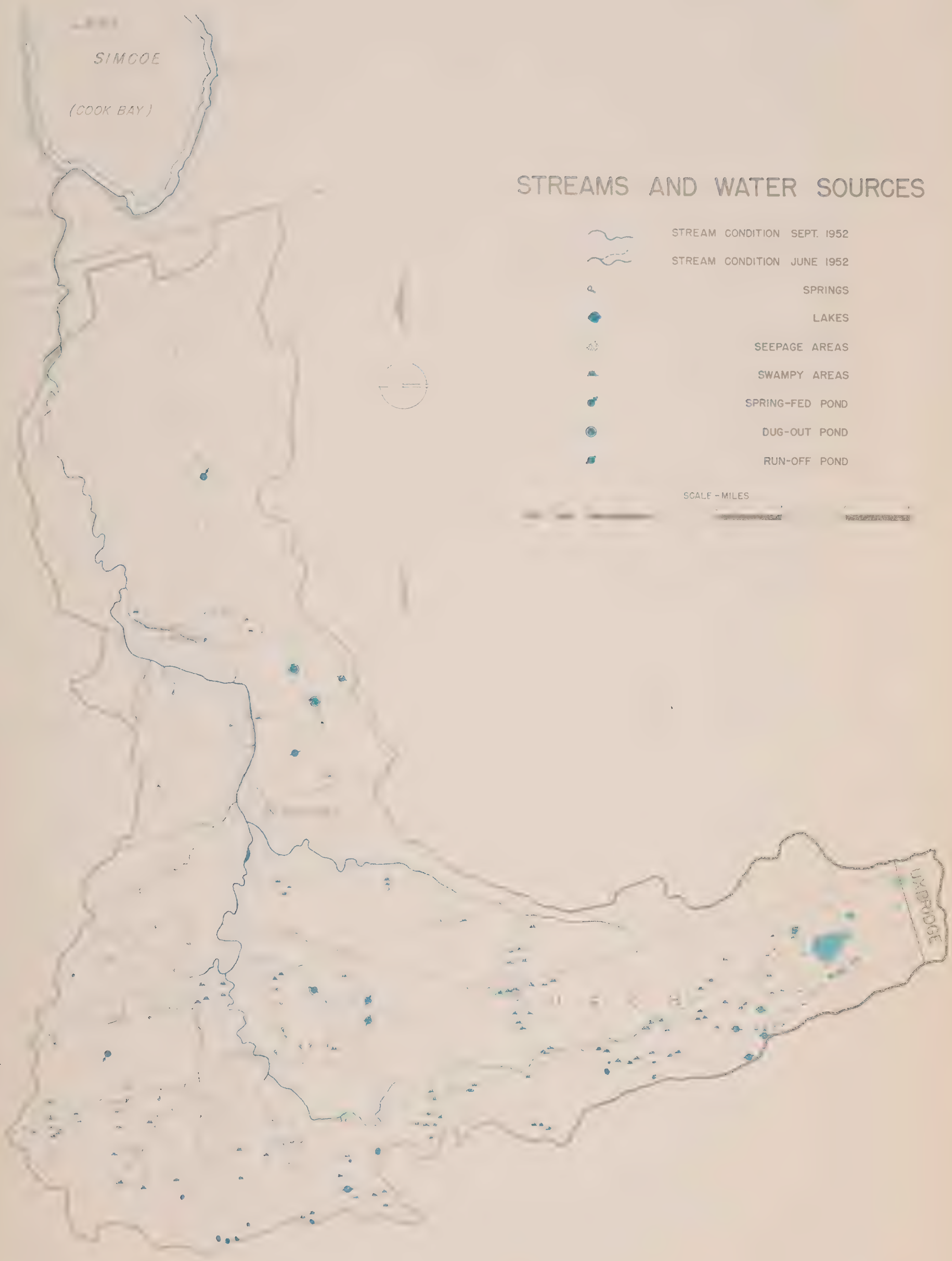
Well Managed Pond. Both the dam and the land upstream are well managed and should ensure the permanency of this lovely pond.

Pond Formed by Damming Stream. The spillway section of this concrete dam is inadequate. Water is undercutting the dam and the pond is filling with silt.

Run-Off Pond. This admirable pond is fed partly by run-off and partly by springs at the headwaters of a tiny tributary watercourse leading into Sharon Creek.

keep the water supply as clean as possible it is recommended that ponds be fenced and an outlet be provided to a trough for stock watering. By so doing the pond could be used for recreation and perhaps other purposes.

The misguided view sometimes encountered that ponds and dams create less water flow and contribute to the drying up of springs is one that is contrary to actual practice.


STREAMS AND WATER SOURCES
STREAM CONDITION SEPT. 1952
STREAM CONDITION JUNE 1952
SPRINGS
LAKES
SEEPAGE AREAS
SWAMPY AREAS
SPRING-FED POND
DUG-OUT POND
RUN-OFF POND
SCALE - MILES
LAKE
SIMCOE
(COOK BAY)
UXBRIDGE

CHAPTER 5

RECOMMENDED LAND USE

1. Introduction

The aim of the conservation program is to use the land according to its use capability. In its final application this will be done on farms by the farmers themselves by means of detailed studies of the individual farms. In dealing with the watershed as a whole something less detailed is required so that planning for the future may be effective and of greatest benefit to the community at large. The accompanying map of Recommended Land Use sums up all that is known of present conditions and offers a guide to future use. It is an inventory of soil resources expressed in terms of that use and management which will serve best the interests of farm production and soil and water conservation. It is suggested that while reading this chapter the map be unfolded and studied along with the text.

2. Basis of the Classification

The use capability of the land may be judged in two ways. The first of these is the examination of the present land use pattern which sums up farm experience over a long period of time. In many instances, this use is found to be adjusted fairly closely to use capability. Often, however, there is no such correspondence because of economic pressure, local custom, and lack of technical knowledge or the mere lack of conformity of rectangular fields to natural boundaries.

The second way is more an analysis of the soil types, slopes, and erosion and related to scientifically derived knowledge of the use of the soils.

Both methods have been used together in this report.

3. Recommended Land Use Classes

Six classes of recommended use account for all the soil types and conditions and are here listed along with the mapping symbols used and the proportion each is of the total (disregarding the marsh).

Mapping Symbol	Designation	% of Area
L	Cultivable land	0.5
CF	Contour tillage	1.4
LR	Restricted use	43.7
P	Pasture	8.8
F	Forest	40.4
ND	Wet land	1.7
	Water surface and urban areas	3.5

It must be understood that any area of any one class may include smaller areas of another class. Only on an individual farm plan drawn to a larger scale could each portion be separated.

L - Cultivable Land - (Yellow on the map)

This type includes fertile flat land with no drainage or erosion problems. No restrictions on use are required beyond ordinary good farming practice to maintain fertility. Only a very small proportion of this class was mapped.

CF - Contour Tillage - (Brown on the map)

In this class are soils with mild to moderate smooth slopes suitable for contour methods of cultivation which would eliminate erosion and help to retain water in the soil. The soils found in this type include medium-textured tills and sandy loams.

LR - Restricted Use - (Pale yellow on the map)

This type forms the largest single class of agricultural land in the watershed and includes lands of mild to moderate, irregular or hummocky slope and eroded soils. Extended rotations and intensive soil-building practices are required to rectify present erosion, prevent further soil depletion and sustain fertility. The planting of row crops should be avoided on the steeper slopes.

The soils of this class include the better sandy loams, the dissected lacustrine deposits of the main Holland Valley, and the glacial tills.

P - Pasture - (Pale green on the map)

Includes land generally not suited to continuous cultivation because of steepness of slope, roughness of topography and natural low soil fertility, as well as bottom lands and other less well drained areas. Planned pasture use, with seed selected to suit the soil conditions, good pasture management and addition of fertilizer as required, will normally take care of all erosion and fertility problems.

F - Forest - (Green on the map)

In addition to recommended forest land, this class includes all presently existing woodlots and reforestation projects. Some of the reforestation is of a private nature, being carried on by individuals. The largest portion comprises part of the Vivian Forest. Nearly all other woodland areas are on lands of low capability and it is recommended that this type of land use be maintained. Other lands not now covered by trees and recommended for such use include rough, steep lands, highly eroded soils, soils providing rather poor pasture growth because of low fertility and excessive internal drainage, and soils whose use is limited by poor drainage.

ND - Wet Land - (Hatched blue on the map)

These are lands of poor internal drainage which cannot be easily drained and which produce a crop only under the most favourable conditions. Except in years that permit late plantings, their normal use is for pasture or hay with species tolerant of wet conditions. Areas suitable for artificial drainage are small and few on the watershed. Some of the silty soils have impeded internal drainage but the difficulty of draining them by tile generally precludes undertaking the cost of that operation. Some small low spots could be made more workable by single lines of random tile.

M - Marsh - (Dotted blue with grass symbols on the map)

This type includes the as yet unreclaimed muck soils of the Holland Marsh. Some work has already been done in clearing the area designated and in providing a drainage system.

This area is indicated in blue on the map. The future use of this land will depend on a number of things. First is determination of the potential value of the soil for reclamation and the engineering feasibility of diking, draining and pumping it. Secondly is the possibility of enterprises risking funds in reclamation and the township undertaking to establish municipal drains. If it becomes clear that it is not to be reclaimed it has a potential value for wildlife. Although at present this tract is not as useful for wildlife as some neighbouring areas, it might, under special management, be made very suitable shelter for ducks, spawning for fish from Cook's Bay or habitat for muskrat.

4. Present Use Compared to Use Capability

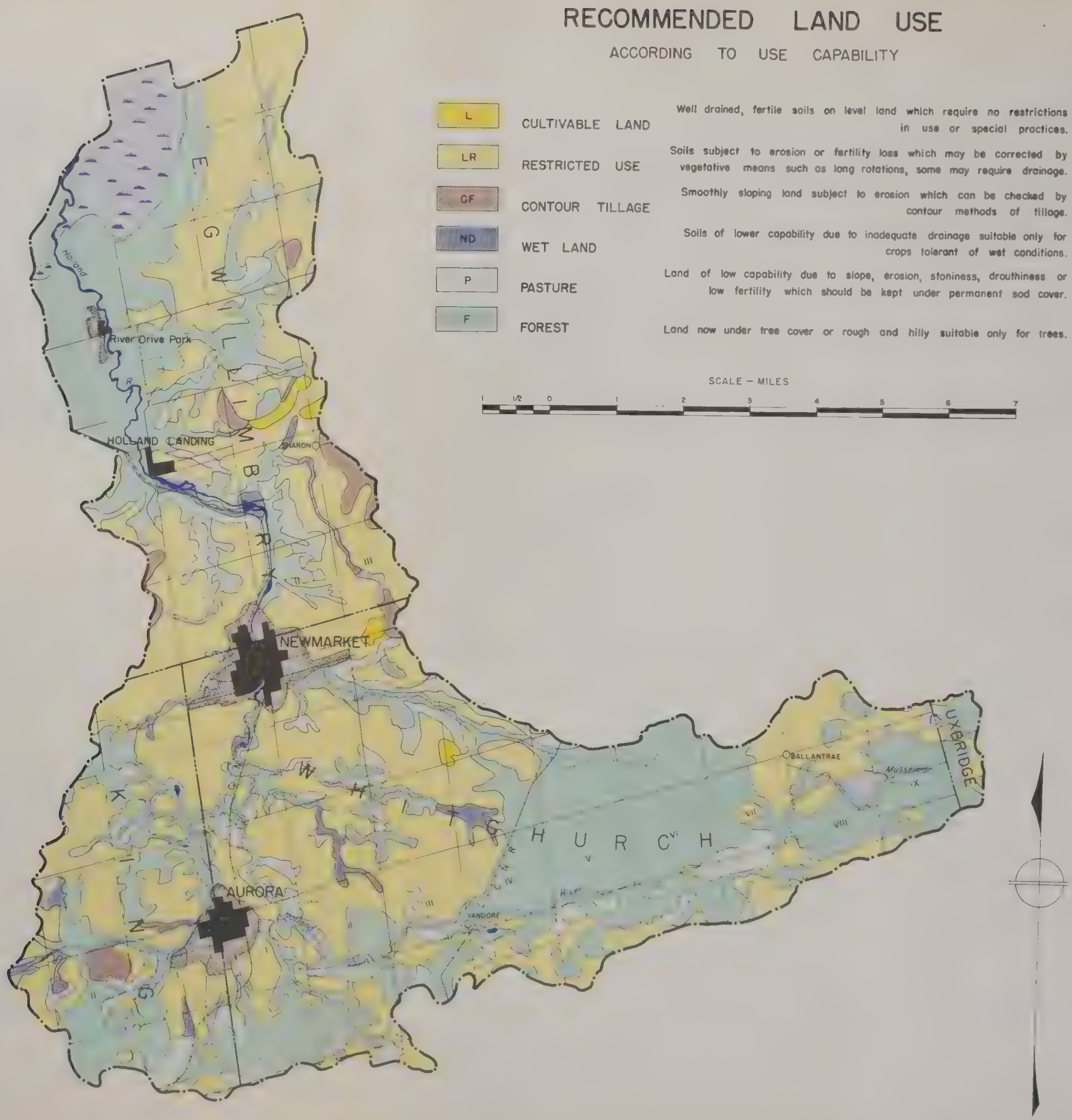
From the record of land use it appears that about 50 per cent is now cultivated under rotation. Consider, for a moment, the whole watershed as one big farm. Less than 46 per cent consists of land suitable for inclusion in a crop rotation.

Forty per cent should be under trees. At present 14 per cent has natural tree cover and 4 per cent has been reforested. Only 9 per cent should be restricted to pasture, yet 17 per cent is at present under permanent pasture. Could this giant farm be planned to take these things into account? The answer is yes, for many adjustments could be made. For instance, barely doubling the capacity of pastures (in many cases it could be increased four times) could cut the amount of pasture; then rougher land could be put into trees.

Cutting regularly cultivated land from 50 per cent to 46 would call for a proportional increase in yield. If the average yields, by widespread use of fertilizer, were brought anywhere near the best yields (on comparable soils), this could easily be made up.

The demand for pasture, even if there were a reduction in acreage, can be met from short-term pasture which is part of the rotation. A five-year rotation, including three years of a grass and legume mixture, gives two years aftermath pasture and one year of pasture, before the sod is turned under. If this appears to reduce acreage of grain (for which there is a high demand for feed) remember that with the use of fertilizer, and lime where necessary, yields on soils which have been built up under sod cover can be expected to be greater than the averages at present. Also, four- and five-year pastures on rough, or wet, land properly seeded and fertilized can be high producers and give one good field crop at least once in five years.

Actually these measures will be carried out on individual farms. An overall adjustment of land use to land capability to bring the land into the recommended use would not radically change the type of farming now carried on. By using and managing every acre according to its capability to produce, production and efficiency could be substantially increased.


RECOMMENDED LAND USE
ACCORDING TO USE CAPABILITY
L CULTIVABLE LAND
Well drained, fertile soils on level land which require no restrictions in use or special practices.
LR RESTRICTED USE
Soils subject to erosion or fertility loss which may be corrected by vegetative means such as long rotations, some may require drainage.
CF CONTOUR TILLAGE
Smoothly sloping land subject to erosion which can be checked by contour methods of tillage.
ND WET LAND
Soils of lower capability due to inadequate drainage suitable only for crops tolerant of wet conditions.
P PASTURE
Land of low capability due to slope, erosion, stoniness, drouthiness or low fertility which should be kept under permanent sod cover.
F FOREST
Land now under tree cover or rough and hilly suitable only for trees.
SCALE – MILES
1 1/2 0 1 2 3 4 5 6 7
Holland
River Drive Park
HOLLAND LANDING
SHARON
NEWMARKET
BALLANTRAE
UXBRIDGE
AURORA
VANDORF
E G W I L L I M B U R Y
W H I T C H U R C H
K I N G

Recommended Land Class L. Well drained, level, uneroded loamy soil constitutes the best class of land. Good management of such land for optimum production is the first step in soil conservation.

Land Class LR. Mildly hummocky land is subject to some erosion which can be easily controlled by sustaining a good organic content in the soil.

Class CF. Long smooth slopes are subject to erosion but can be controlled by contour methods of cultivation.

Class P. Bottomland along streams is subject to annual flooding and is best used for long-term pasture.

Class F. Steep, irregular slopes with very coarse, droughty soils would be better used if kept under tree cover.

CHAPTER 6

CARRYING OUT A SOIL CONSERVATION PROGRAM

1. Need For Soil Conservation

Is there a need for a soil conservation program on the Upper Holland Valley? An impersonal examination of the soil in the light of all available knowledge of soil erosion and run-off shows that there is a need for the application of special measures for soil and water conservation. This is clearly recognized by a few operators, either through direct evidence in the form of gullies, wind erosion, or a general deterioration of the land. It is recognized by others in the realization that with all the advantages of modern tillage implements, the use of chemical fertilizers, the improvement of strains of crops, and modern chemical methods of disease, pest and weed control, we are not making such great advances in yields and efficiency.

Most of the people recognize the situation in a rather vague way, but have not come to grips with it because the ordinary day-to-day and year-to-year pressure engages their attention more directly. Most of these people recognize specific problems when they are pointed out to them, and are willing and eager to do something about them if any action required fits in with the ordinary operation of the farm.

Beyond the limits of the individual farm there is a general feeling among both town and country people that the valley as a whole is not in as good a state as it might be. Dry years mean poor yields on the farm, and in towns the water supply from wells, though sufficient, does not seem to be big enough to meet the anticipated demands with the growth of the towns.

The very light soils in the eastern part of the watershed have long since become so depleted, so eroded, and so droughty that they were unable to be put to any agricultural use at all. Reforestation was begun on some of these lands quite

some years ago, and the beneficial results are already obvious. More land has yet to be treated in this manner. However, planting trees is only a small part of the program of protecting and improving our soil and water resources.

2. Conservation on the Farm: Individual Remedies

In Chapter 4 there were described many of the farming methods and special techniques designed to overcome erosion and to make better use of water. In the more obvious cases, any one or more of these measures might be applied; for example, many operators now recognize that natural watercourses when left open by cultivation are over-deepened by the spring freshets or occasionally by summer storms. The immediate loss of soil may not be serious, but the smothering of crops by soil-wash or the interference to cultivation by gullies are inconveniences. A simple answer and one already put in practice by some is the establishment of grassed waterways.

Steep and badly eroded slopes which are no longer fruitful and are difficult or impossible to cultivate may be planted to trees. In a previous chapter mention was made of gullies which in some instances had been healed or partly so by the farmers. Many more instances could be looked after.

Occasionally run-off, specially in the spring, is quite a nuisance where it concentrates water around the barns, where it cuts away driveways, or where it washes away manure. These situations are not good to have in the modern efficient mechanized farm, and could easily be corrected by the use of diversion ditches, the construction of which may call for some technical assistance in design, which can be carried out by a farmer with his own implements.

More and more farmers are recognizing the value of grass cover, not so much as a soil-protective measure, but as an efficient method of producing grazing and fodder. This trend has been made possible by common use of such implements

as the Forage Harvester. Improved methods of pasture management, particularly the use of the electric fence, and rotational pasture have helped to increase the trend to good grassland management. From this time on, more emphasis might be placed on these measures for conservation purposes, and not merely useful and efficient methods of production.

These are a few examples of the individual remedies to specific soil erosion and water loss problems.

3. Conservation on the Farm: Farm Planning

The best way to achieve soil and water conservation and to bring a farm into its highest state of production is to plan the farm for these purposes. Planning is not new to a farmer; his work day and his work year have to be planned, and the cropping in any one field is likely to be carried out according to a planned crop rotation.

The introduction of special measures for conservation may somewhat disturb the present layout of a farm. As was shown in the previous description of conditions on the watershed, there can be a serious maladjustment of use to capability simply because field boundaries do not conform to the natural boundaries between different soil types and conditions. In many cases a rotation in a field may be worked out because it fits the general management of the farm, but without special consideration to the needs and conditions of the soil in that field. All of these things can be worked out better if the farm is planned.

Any farmer can get help in this from the Soil Advisory Service of the Ontario Agricultural College, by applying to the County Agricultural Representative in Newmarket. The Farm Planners at first do for the farm much the same as has been done in this survey of the watershed, but on a larger scale of mapping, in a greater degree of detail, and with more careful consideration of the operations on that particular farm. From such a map they are able to produce a plan for the layout of the farm, the introduction of special methods of tillage, of minor

engineering works, and carefully working out the crop rotation not only to give best immediate returns but also to improve the condition of the soil.

4. Who Can Help With the Job?

There are a number of government agencies as well as organizations of farmers who can help in carrying out a soil conservation program. The Agricultural Representative, the Agricultural College, and the extension services have already been mentioned and are quite familiar to most farmers. In addition to the Soils Department at the College, the Agricultural Engineering Department and the Agronomy Department ca help in this work.

With respect to trees, either those to be plant or those already growing on the farm, or those which may be encouraged to grow naturally, the Zone Forester, from his headquarters at Maple, is available to the farmers for assistance and guidance.

Farm federations, the Soil and Crop Improvement Association, conservation committees, Junior Farmers, and the Farm Forums can all help in education, in trying out new methods and in organizing new ventures.

Other citizen groups, such as Rod and Gun Clubs Hunters and Anglers, conservation clubs, and field naturalists are interested and willing to help where they can.

In a special position is the river valley Conservation Authority. Although it may take direct action with respect to dams, reservoirs, ponds, parks and forest lands, its function in soil and water conservation on the farm is that of leadership, organization, and as a co-ordinating agency. Its work in this regard is most effectively carried out through its Land Use Advisory Board. In time the Authority may have the services, full- or part-time, of a permanently employed field officer, who may act between the Authority, its Board, the farmers, and all the bodies and agencies listed above.

The Authority may, to a limited extent, take a direct part in assisting farmers in carrying out conservation projects. It may, for instance, provide grants in aid for the construction of farm ponds; it may purchase a tree-planter for the use of farmers in establishing plantations; it could acquire other equipment such as a portable wood chipper to help clean out woodlots and produce a useful by-product. Special earth-moving equipment might be purchased or made available through contract to assist farmers in minor engineering works, such as diversion ditches, which the farmers might not be able to do with their own equipment. Where conservation remedies call for a supply of labour not ordinarily available on the farm, for jobs like spot tree-planting, clearing woodlots, improving streams, the Authority might be able to get help from interested people where the farmer is unable to do so.

5. Where to Begin

In conservation work it has been found the one feature which is of common interest is water. That is why the river watershed is the basic unit of organization. People on the land normally have a strong local community organization and co-operation is still the basis of much of rural life. The unit of organization which takes advantage of both of these situations is the Little Valley. The Little Valley is the watershed of a small tributary of the river where everybody knows everyone else. They are accustomed to working together, and they all know that they share the one little river.

With this idea in mind, more detailed studies were made of three little valleys on tributary streams. One or more of these valleys are suggested as good places to start a soil conservation program on the Upper Holland Watershed. A more detailed description is given in the next chapter.

CHAPTER 7

THE LITTLE VALLEYS

1 Choosing the Valleys

River conservation begins at the headwaters of the tributaries. Soil and water conservation is necessary on the sloping land which is found near the headwater or along the streams where they are cut deeply into the plains. The little valleys that were chosen represent these conditions. They are also fairly representative of average soil conditions but do not contain much of the severely eroded sandy soils nor of the flat poorly drained clays and silts Each represents a fairly well defined community.

Neither by the topographic map nor by local usage are definite names assigned to the creeks but they should be easily recognized from the names given here. They are: Snowball Creek, Wesley Corners Creek and Sharon Creek.

Snowball Creek rises near Snowball Corner on the third line of King and joins a branch from the South on the south-west fringe of Aurora. Wesley Corners Creek starts about half a mile east of Wesley Corners and runs north-west to join the Holland above Newmarket. Sharon Creek rises in the third concession, crosses the highway south of Sharon, then runs parallel to it until it turns west to join the river behind David's Temple.

2. The Land Use Capability Classification

The land on these watersheds was classified in the same way as land is done for a farm plan, using the Land Use Capability Classification. The classes are as follows:-

A - Suitable for cultivation

Class I - Without any special practices

Class II - With moderate restriction in use or simple practices

Class III - With severe restrictions in use or intensive practices

B - Suitable only for occasional cultivation

Class IV - With limited use and intensive practices

C - Suitable only for permanent vegetation

Class V - With no special restrictions or special practices

Class VI - With some restrictions in use or special practices

To the capability ratings may be added recommendations in use. The classes of recommended land use are described as follows:

The land on the Holland has been classified and mapped in terms of recommended use. The recommended classes are indicated on the map by adding a symbol, C, R or D to land of capability Classes II and III, and T and P to capability Class IV.

Use Classes IIC, IIR, IIIC and IIIR are on slopes and subject to erosion. It is their susceptibility to erosion which downgrades their capability to II or III. The protection which may be given to them is either by mechanical methods, and they are thus designated as IIC or IIIC, or by vegetative methods, and they are thus indicated as IIR or IIIR.

Some land is of lower capability, as it stands naturally, by reason of inadequate drainage, and is indicated by the letter D. Much of this land, of course, has been adequately treated for this either by tile drains or ditches.

Land of capability Class IV requires by definition only limited use and certain special practices. Land may be downgraded to this class because of rough topography and erosion and is indicated by the symbol T, or because of very poor drainage and indicated by symbol P.

A

Land Class I

Less than 5 per cent of the area belongs to this class. It includes clay loams, silt loams and loams, well drained, level and not eroded. It is suitable for any of the

Land Use Capability Class I. Level, uneroded, well-drained loamy soil requires no special treatment or restrictions in use.

Class II C Land. A smooth, gentle slope exposes this land to slight erosion which can be controlled by cultivating across the slope.

crops normally used and requires no special tillage methods nor restrictions in use. With fertility levels maintained and under a simple three-or four-year crop rotation this land can be held in a high state of production for years to come. The best and most extensive use of this land is the first rule of conservation because, unless this land is made to produce as much as possible, land of lower capability is used too heavily and may deteriorate.

Land Class IIC

This class includes the same soils as Class I but on slopes up to 5 per cent which are subject to erosion. Erosion and water loss can be controlled by contour methods of cultivation. There is not a large proportion of the land in this type.

Land Class IIR

This includes a large proportion of the area and carries a great deal of the field crops now grown. The types of soil are similar to Class I and Class II on irregular or hummocky slopes, subject to erosion but not suitable for contour methods of cultivation. Therefore the only means of controlling erosion are keeping the land covered as much as possible and building up the organic content of the soil. This land cannot be kept under three-year rotations like Class I land. Any means such as trash mulching, winter grains, winter corn crops and sod crops are suitable.

Also included in this land are the sands and sandy loams and gravelly soils which lose fertility and humus more quickly and which should therefore be somewhat restricted in use.

Land Class IID

Some land of this class is found in the Wesley Corners Creek watershed. It is not well enough drained naturally to be considered Class I land. Because of the silty nature of the soil there is a question as to whether it is suitable for tile drainage or if this practice is economically sound. Areas

Class II R Land. Gentle but irregular slopes are subject to erosion and not suitable for contour cultivation. They require emphasis on building up organic content to resist erosion.

Class III C Land. Long, smooth slopes with a rise of one in ten are suitable for contour strip-cropping. Watercourses should be left in grass.

of this land should be arranged in fields where attention can be given to improved surface drainage. Even then, it may not be possible to carry some crops on it because of the wet conditions.

Land Class IIIC

This is on smooth 6 to 12 per cent slopes which are eroded, or subject to erosion which can be controlled by special tillage methods. These include contour cultivation, contour strip-cropping, diversion terraces and grassed waterways.

Land Class IIIR

These are the irregular slopes up to 15 per cent on the better soils, clays, silts and loams, and much of the rough land on the coarse-textured soils. The management of this soil calls for a preponderance of sod crops in the rotation and very limited use of intertilled crops which expose land to erosion and drought.

Unfortunately the rougher land in many cases covers just a corner of a field as presently laid out and there is a tendency to work it along with better land in the same field, even though it is obviously more difficult to work and yields less. The purpose of a farm plan is to rearrange the layout of a farm to take these conditions into account.

Land Class IIID

There is only a little of this class in the bottom lands. Generally this class of land is recommended for tiling, but on the Holland this is not considered possible at this time. There is more a tendency to keep it under pasture. If this is done it should be seeded to mixtures of species adapted to meet conditions and managed accordingly.

Land Class IVP B

Low-lying patches in the uplands and swampy stretches along the streams are wet, yet not suitable for artificial drainage. Sown to appropriate species they can be

Class III R Land. These slopes are too irregular for contour strip crops. Erosion can be controlled by emphasizing soil-building crops in the rotation and keeping the soil covered by sod, mulch and winter grains.

Class IV P. This is wet land not suitable for artificial drainage. When neglected it runs to sedge and willow, but could be cultivated occasionally and reseeded to hay and pasture mixtures adaptable to wet conditions.

Class VI Land. Slopes like this one of 35 per cent should be under permanent grass or trees. If under grass, it should be improved and its use limited to prevent overgrazing and to check gullies forming in cowpaths.

productive of quite good pasture. In favourable years when they dry early they may be sown to late crops but are not suitable for regular cultivation.

Land Class IVT

Along the sides of valleys and in some hilly areas the land is too steep, not only for regular cultivation because of the hazard of erosion but also too steep for use of many implements. This land is better used for hay and pasture with only occasional cultivation. This class includes steep phases of both the good soils and the coarser soils as well.

C

Land Class V

Bottom lands along the streams are usually left in either grass or trees, usually due to recurrent flood which precludes cultivation. These should, however, not merely be left under permanent vegetation but managed to give best returns from grass or trees, whichever is on it. Many of the woodlots that require improved management are in this class of land.

Although there are no special restrictions on the use of the land itself, care should be taken to protect the stream flowing across it. Unlimited access by cattle is responsible for a great deal of trampling and consequent muddying of the streams.

Land Class VI

This represents the roughest hilly land and coarsest soils. For the most part, this land should be under trees. When trees are planted the furrows should be on the contour as far as is possible. In working existing woodlots, up and down hill tracks that might induce gullying should be avoided. Plantations and woodlots should be managed so that good cover is retained. Woodland management is discussed in the Forestry section of this report.

3. Conditions on a Sample Area

The following table of figures shows how much there is of each class of land on the watershed of Sharon Creek and how each is used.

PRESENT LAND USE ON EACH RECOMMENDED LAND USE CLASS (IN ACRES)

Present Land Use	Recommended Land Use Classes							Total	Per Cent
	I	IIC	IIR	IIIR	IVP	V	VI		
Woodland		8	40	1	1	26	22	98	4.3
Spring Grain	29	42	481	41	8		3	604	26.7
Fall Grain	26	16	261	14	4	3		324	14.2
Hay	44	52	480	31	7	6	3	623	27.5
Farm Buildings & Yards			59	1		1	2	63	2.8
Orchard			2					2	.1
Pasture	6	7	135	24	56	37	50	315	14.0
Hoe Crops	4	12	71					87	3.8
Fallow			44	11				55	2.4
Urban	2		66					68	3.0
Idle			2	4	1	14	4	25	1.1
Total	111	137	1,641	127	77	87	84	2,264	
Per Cent	4.9	6.0	72.5	5.6	3.4	3.8	3.7		

It is interesting to note that 89 per cent of the land is in Classes I, II and III, suitable to be cultivated regularly in rotation. Only 74.6 per cent is presently used for crops in rotation. By far the greatest proportion of the spring and fall grains and hay are now carried on land higher than Class IV and all the hoe crops (corn, roots etc.) are on Class I and II land.

A large proportion of the pasture is now on land of lower capability. That another large proportion is in Class IIR land is natural because that land represents nearly three-quarters of the area. It is usually in fields more remote from the barn. A few small acreages of pasture and woodland are on high capability land and a few small

acreages of cultivated crops are on land of lower capability. This can be accounted for by the fact that rectangular fields with boundaries parallel to the township survey do not conform to natural divisions of the land.

There is, therefore, no gross maladjustment of land use to capability. Any changes required are easily within the scope of simple farm planning.

Of the land under rotation about one third is in hay, one third in spring grain and one fifth in winter grain. The rest is in hoe crops and fallow. It would appear that four-year rotations are followed on some farms and three-year on others.

4. Adjustment of Land Use

Generally speaking, four-year rotations with a proper fertilizer program should keep Class IIR land in a high state of production without undue erosion or water loss indefinitely. Five-year rotations which would include a preponderance of soil-building crops (grasses and legumes) would be recommended on Class III land. With contour tillage, land Class IIC could be handled safely in a three- or four-year rotation like Class I.

Watercourses should be protected by permanent sod. Incipient gullying can be controlled in many cases by leaving headlands in grass. The adoption of these methods would not seriously affect most farm layouts.

Longer rotations than those commonly practised do not call for any major change, as it was noted that there is actually more land available for cultivation than is now under rotation. To bring some Class II land, now in pasture, under rotation might call for extending and improving lanes to make it more accessible.

That there is no serious soil conservation problem can be attributed partly to the high quality of farming practised in the community and partly to the fact

Good Land Use. This farm layout illustrates a balanced crop rotation well suited to control loss and deterioration of soil on these slopes.

Alternative Remedies. Clover on the left and pine trees on the right are both suitable use and protection for eroded sandy soils.

that there is so much good land. The other little valleys include rather larger proportions of land of low capability and the application of conservation measures is more necessary.

5. <u>The Stream</u>

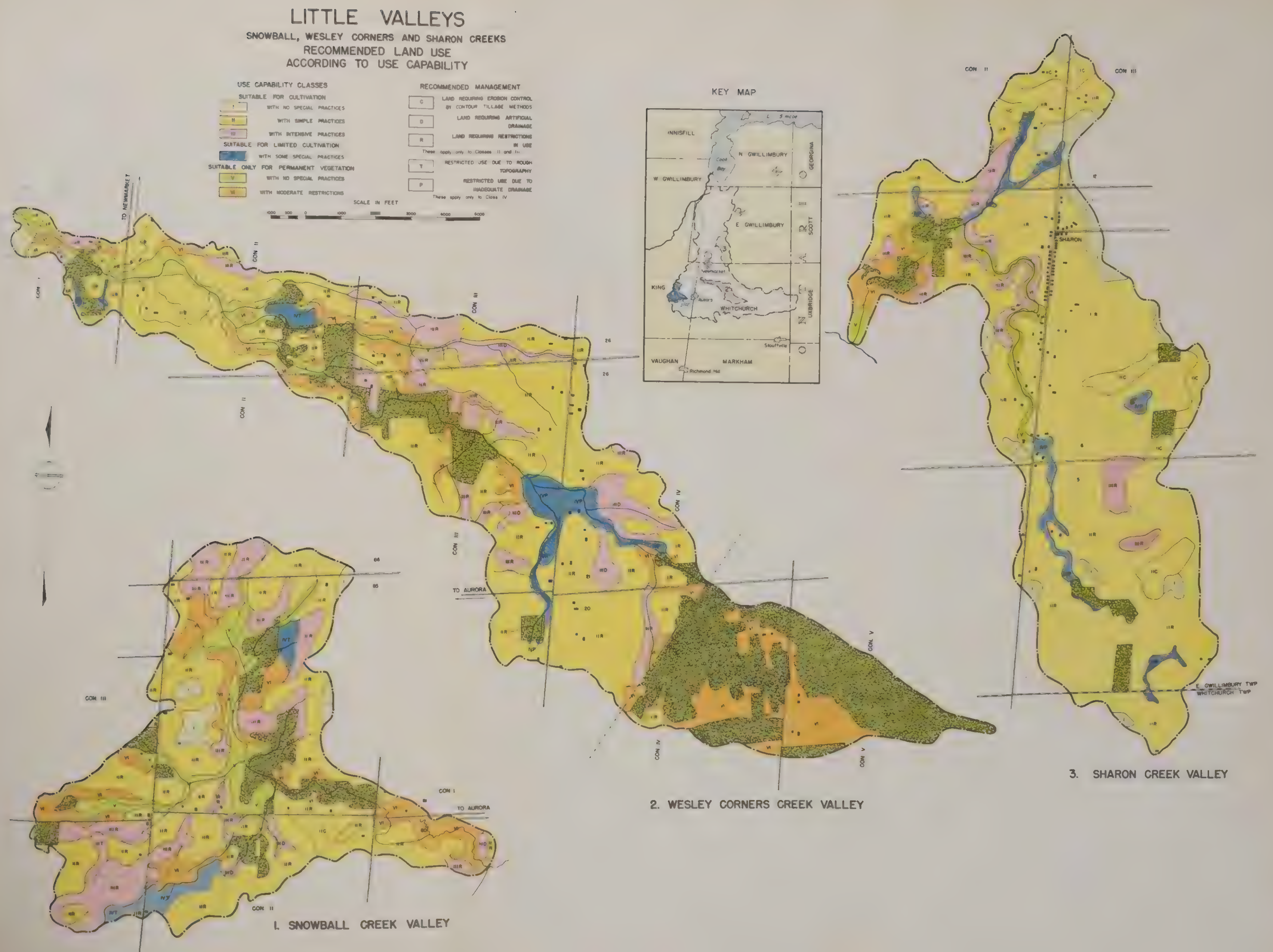
The stream itself is not permanent. It is used during wet seasons for watering stock. Some standing ponds are used throughout most of the season. Many of the barnyards are sited near the banks of the stream and are drained into it.

Ponds could be built along the course of the stream which would provide supplementary supplies of water for stock or for fire protection. The stream channel could be protected by trees, shrubs and grass to prevent silting and cut down evaporation loss, so that there would be a better supply of water.

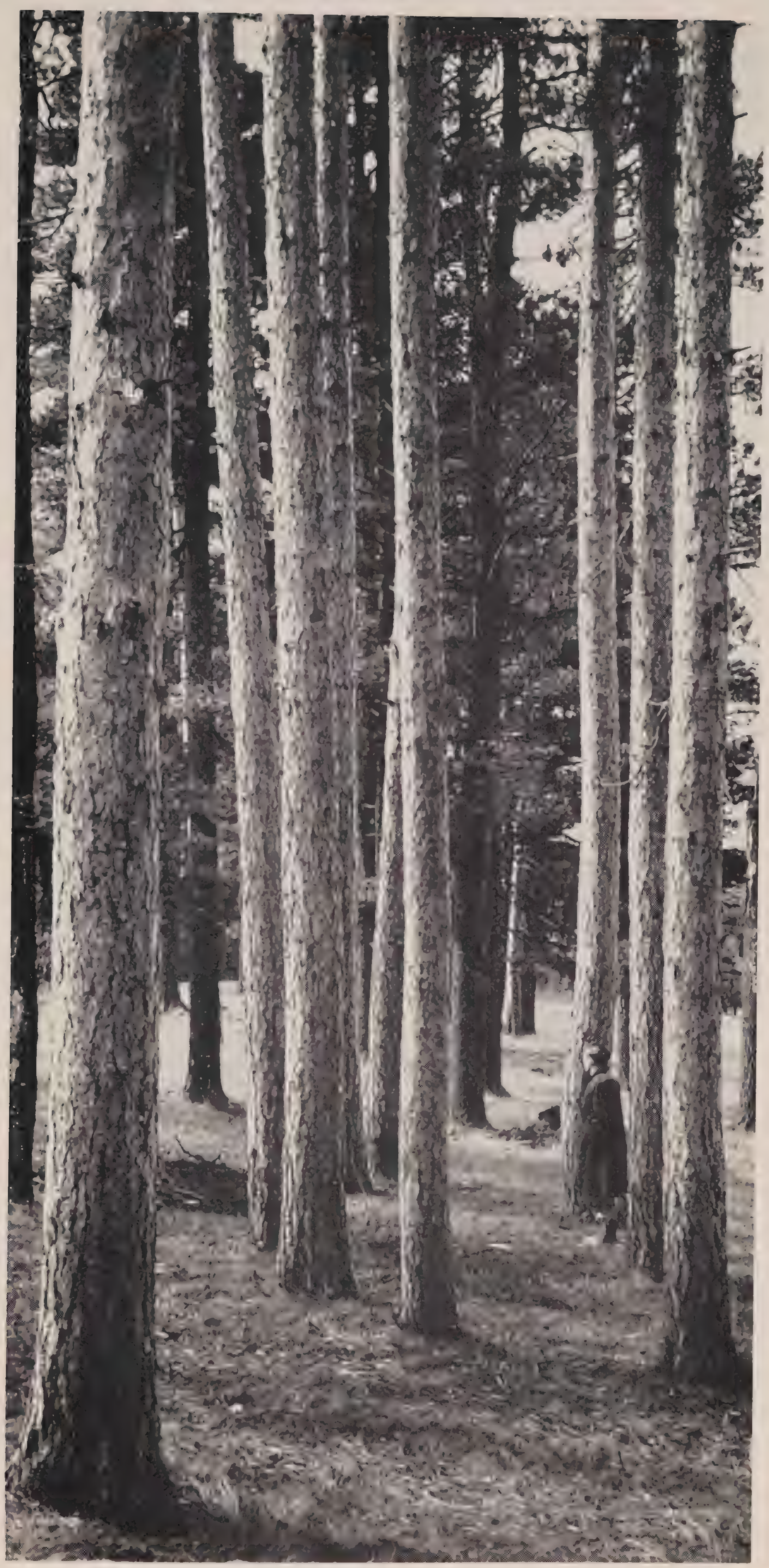
There is a considerable surface run-off, especially when the frost is still in the ground. There is not likely to be much improvement in this by radical change of land use, as it has been shown that no such change is necessary. Improvement of the stream, therefore, is a measure by itself.

6. <u>Projects on the Little Valleys</u>

Careful study should be given to the map showing recommended land use on the little valleys. One, possibly Snowball Creek, or more could be chosen as a starting point. An Advisory Board of the Authority could call a meeting of the people of the valley and a start made according to the interest shown by the people.


LITTLE VALLEYS
SNOWBALL, WESLEY CORNERS AND SHARON CREEKS
RECOMMENDED LAND USE
ACCORDING TO USE CAPABILITY
USE CAPABILITY CLASSES
SUITABLE FOR CULTIVATION
WITH NO SPECIAL PRACTICES
WITH SIMPLE PRACTICES
WITH INTENSIVE PRACTICES
SUITABLE FOR LIMITED CULTIVATION
WITH SOME SPECIAL PRACTICES
SUITABLE ONLY FOR PERMANENT VEGETATION
WITH NO SPECIAL PRACTICES
WITH MODERATE RESTRICTIONS
RECOMMENDED MANAGEMENT
LAND REQUIRING EROSION CONTROL BY CONTOUR TILLAGE METHODS
LAND REQUIRING ARTIFICIAL DRAINAGE
LAND REQUIRING RESTRICTIONS IN USE
These apply only to Classes II and III
RESTRICTED USE DUE TO ROUGH TOPOGRAPHY
RESTRICTED USE DUE TO INADEQUATE DRAINAGE
These apply only to Class IV
SCALE IN FEET
KEY MAP
INNISFILL
N GWILLIMBURY
GEORGINA
W GWILLIMBURY
E GWILLIMBURY
SCOTT
KING
WHITCHURCH
UXBRIDGE
VAUGHAN
MARKHAM
Richmond Hill
Stouffville
ONTARIO
TO NEWMARKET
CON II
CON III
CON IV
CON V
CON I
TO AURORA
SHARON
E GWILLIMBURY TWP
WHITCHURCH TWP
1. SNOWBALL CREEK VALLEY
2. WESLEY CORNERS CREEK VALLEY
3. SHARON CREEK VALLEY

FORESTRY



When Governor Simcoe laid out the town of Gwillimbury, one mile north of Holland Landing, red and white pine covered most of the sand flats near the old Indian Landing. To-day only a few trees remain which give an indication of the kind of timber which can be grown here.

CHAPTER 1

THE FOREST

1. At the Time of Settlement

Early descriptions of the forest cover of the Holland Watershed are very meagre and those which have come to light deal, for the most part, with the section west of Yonge Street where the portage trail crossed from Holland Landing to the headwaters of the Humber.

Alexander MacDonnell, who accompanied Governor Simcoe on his journey to Lake Simcoe, writes in his diary under the date of September 27, 1793,

> "The land through which we passed is chiefly wooded with maple, bass , beech, pine and cedar."

Later as they cross the height of land into the Holland Watershed near Hackett's Lake, he says:

> "After dinner we proceeded on, went over very uneven ground, the soil in some places indifferent but in general not bad. Saw some very fine yellow pine and black birch."*

Alexander Aitken, a surveyor, who accompanied Simcoe on the return journey from Holland Landing on October 11, 1793, says:

> "His Excellency with the rest of the party set out through the woods to the last mentioned place (York) and got about 2½ miles from the landing and encamped on the East Branch of Holland's River in a cedar swamp."

A survey of clergy reserve lots made by Charles Rankin in 1848 says the best pine had been cut away. He must be referring to the very choice trees suitable for masting and possibly square timber because, up to this time, the only way of getting the timber out was by teams and only the very best would justify the long haul to Lake Ontario. The timber on these lots is described as hardwood and hemlock, though hemlock seems to include some pine.

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* MacDonnell undoubtedly meant red pine (*P. resinosa*) and yellow birch (*Betula lutea*) since yellow pine and black birch are not native to this area.

In 1851 W. H. Smith* writes:

"About four miles before reaching Lloydtown (from the South) you cross a cedar swamp (east end of Thomson's Lake) after which the timber becomes principally pine and hemlock for the next two miles; large tracts of land bordering the road, being still covered with wood. The country then opens and large clearings lie before on either side of you. The character of the timber here becomes changed and a large proportion of it is hardwood. The soil, the whole distance is of a loamy character, varying in consistence. The country, generally, has a new appearance, a large portion of the stumps being still standing in the fields ....
"From Lloydtown to Yonge Street is twelve miles in an easterly direction, the road being varied from a direct line in order to avoid a large swamp (the south edge of the Holland Marsh) which projects into the township. Seven miles from Lloydtown you pass Tyrrwhitt's Mills or Kettleby, where is a grist and saw mill. The situation is picturesque and would be more so had a little of the timber been left standing on the hills. Here, however, the universal Canadian practice has been followed in clearing the land, that of sweeping away everything capable of leaving a green leaf; although it requires a generation to repair the devastation of a few hours. The new settler, however, looks upon trees as enemies which must be destroyed on any terms and it is not till he has been settled for some years, and begins to feel comfortable, that he wishes he had left a few trees to ornament his domain.
"Between Lloydtown and Tyrrwhitt's Mills the road is very hilly and for part of the distance the land is timbered with cedar, hemlock and pine with a little hardwood scattered in."

The forests of the Upper Holland must have been very similar to those described above, with sugar maple, beech and basswood on the better drained agricultural land and pine, both white and red, on the sandy lands of the moraine and deltate plain near Holland Landing. Hardwood swamps of silver maple and elm occupied the wet sites on mineral soil, while cedar and tamarack occurred in the wettest swamps, particularly on the muck and peat areas and along the streams.

2. Since Settlement

The cutting of the forests began with the removal of selected pine for masts and spars and possibly oak and tamarack for shipbuilding. Then followed the period of pioneer settlement when the land was cleared for farming and

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* W. H. Smith. Canada: Past, Present and Future. 1851.

WOODLAND ON OCCUPIED FARMLAND - CENSUS OF CANADA FIGURES

Township	Township Area	1850		1860		1890		1910		1920		1930		1940	
		Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres
East Gwillimbury	57,058	35	20,188	26	14,824	20	11,418	5	2,696	7	4,234	10	5,470	16	9,112
King	83,775	39	33,044	35	29,063	15	12,360	6	5,419	8	6,836	10	8,148	11	9,170
Whitchurch	56,310	40	22,575	34	19,021	19	10,800	8	4,620	9	5,378	10	5,420	11	6,269
York County	465,469	36	169,889	32	151,364	16	76,329	6	26,505	8	37,984	8	38,246	9	43,699

MAPLE SUGAR PRODUCTION - CENSUS OF CANADA FIGURES

County	1850	1860	1870	1880	1890	1900	1910	1920		1930		1940	
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Gals.	Lbs.	Gals.	Lbs.	Gals.
York	163,941	194,762	113,522	38,807	30,192	24,539	851	20	2,200	80	4,467	144	2,401
	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.	Gals.		Gals.		Gals.	
	16,394	19,476	11,352	3,881	3,019	2,454	85	2,222		4,475		2,415	

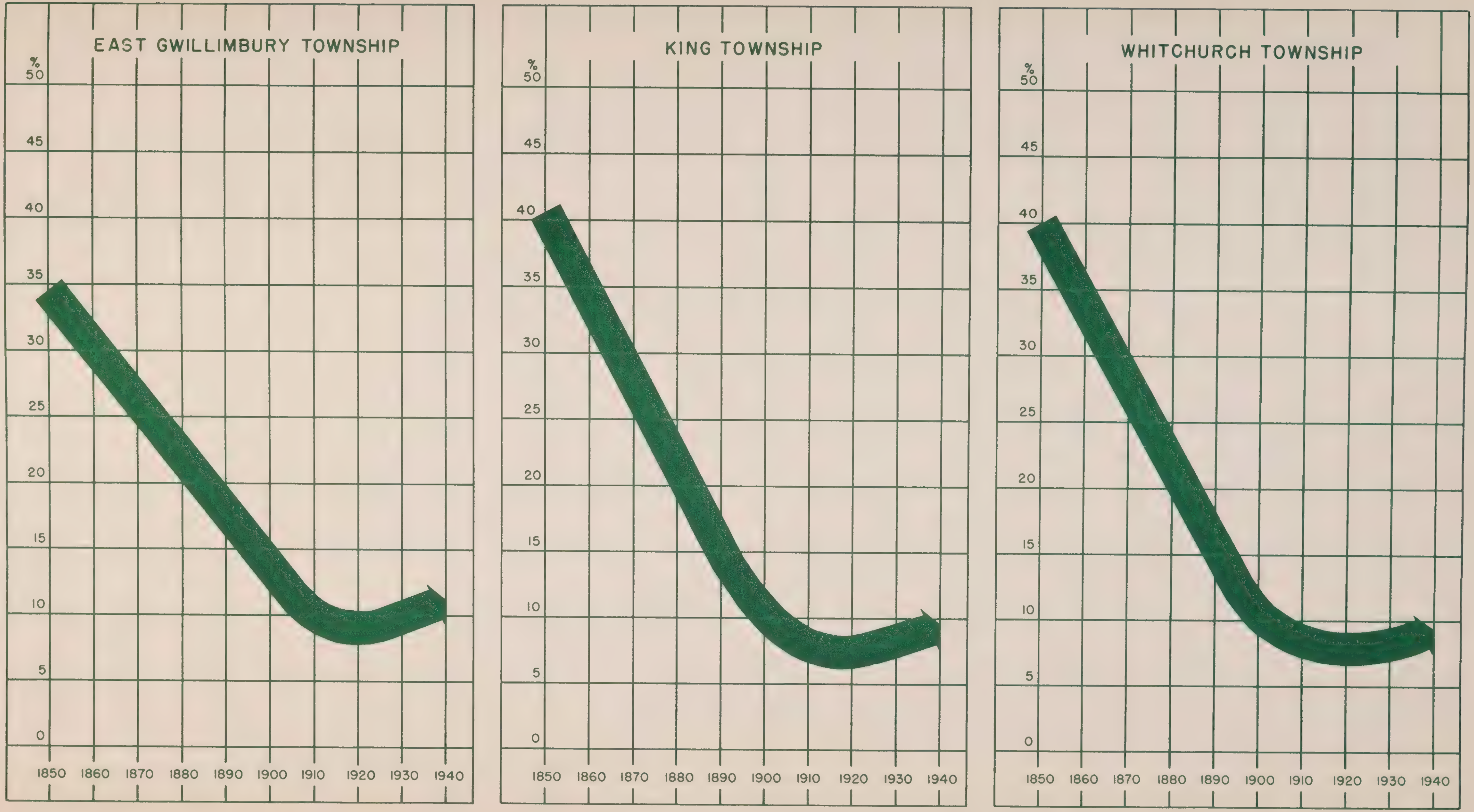
For purposes of comparison the pounds of sugar figures in the top half of the table have been converted to their syrup equivalents in gallons and added to the syrup figures.

there was only a limited market for the products of the forest except in the form of potash.

The settlers' most efficient weapons in land clearing were fire and cattle, which two elements are the greatest menace to our woodlands today. The great trees were felled with axes, the trunks cut into lengths that could be handled by oxen and dragged into piles to be burned; brush was piled by hand and burned. Following this, cattle were pastured in the area to browse down all new growth which might attempt to get a start. The pioneer regarded trees as his enemies and fire and cattle as his friends. It is only in very recent times that such ideas, ingrained by generations of toil, have begun to disappear.

With the construction of railways in the 1850's an efficient means of hauling logs long distances was provided and lumbering went along with settlement. When a new area was opened up it was not always the best land that was taken first as the rolling, light land bore more pine and was easier to clear. On each farm, land was usually cleared first along the roads and the woodland cut further and further back towards the end of the farm which lay farthest from the road. This was done, in most cases, without reference to the soil except where it was swampy or otherwise entirely unsuited to cultivation. In the Upper Holland Watershed today, the two large blocks of remaining woodland are the swampland north of Holland Landing and the sand area west of Ballantrae.

The rate of reduction of the forests was very rapid, for the Census of Canada returns show that by 1850 occupied farm land was only 35 per cent wooded in East Gwillimbury Township and 40 per cent wooded in King and Whitchurch. The records indicate that the minimum areas of woodland in these townships were reached about 1910 and that there has been some increase since, though the records are not accurate and direct comparison between Census figures in different years is dangerous and may be misleading.



PER CENT WOODLAND ON OCCUPIED FARM LAND

The actual measurement of woodland in the Upper Holland Watershed made in 1952 shows a total of 8,438 acres or 14.1 per cent of the total area of 59,808 acres.

CHAPTER 2

FOREST PRODUCTS

In the Upper Holland Watershed the pattern of lumbering, land clearing and settlement was much the same as in other parts of Ontario. These lands produced forests of huge maples, white pines and other species but because of the range of hills along the south edge of the watershed and the impossibility of taking the timber out to the great lakes via Lake Simcoe and the Severn River there was virtually no way of getting it to the market before the advent of railways.

1. Early Policy

Previous to 1826 the only persons authorized to cut timber on the public lands were the contractors for the Royal Navy or those holding licences from them, and there was great infringement of the regulations and much illicit trade. But in this year the first steps toward making the forest resources a source of revenue to the Province and "so securing to the public a share of the wealth drawn from the public domain" led to co-operation among the officials and the termination of the contractor's monopoly. The inauguration of a system under which anyone was at liberty to cut timber on the ungranted lands of the Ottawa lumber region on payment of a fixed scale of rates to the Crown overcame in large part the annoyance of the people and authorities in the colony against the export of the sound Canadian timber for the British navy.

2. Masting

The selection of mast timber was made by government agents who went through the forest blazing with a broad arrow - the mark of the British Government. As late as 1827, when Peter Robinson was appointed Surveyor-General of His Majesty's woods and forests in the province of Upper Canada, he was instructed "to make a survey of the districts where

FOREST PRODUCTS OF FARMS

CENSUS OF CANADA FIGURES

YORK COUNTY

PRODUCT	SPECIES	UNIT	1870	1880	1890	1900	1910	1920	1930	1940
PULPWOOD		CORDS	*		0	39	7	75	0	0
TANBARK		CORDS	1,689	1,530	1,833	329	7			
LATHWOOD		CORDS	57	1,925	4,166					
MASTS & SPARS		NUMBER	27	420	5	3 (2)	0 (2)			
STAVES		THOUSANDS	303	422	105					
FENCE RAILS		NUMBER						12,397	6,878	
FENCE POSTS		NUMBER			53,053	25,038	10,099	11,397	9,200	
POLES		NUMBER			1,230	167	1,476	80	248	
RAILWAY TIES		NUMBER			13,240	2,931	300	50	0	
SQUARE TIMBER	ASH	CU. FT.				636	114			
	BIRCH	" "	642(1)	105(1)	6,825(1)	130	400			
	ELM	" "	4,889	5,617	17,722	14,324	5,078			
	MAPLE	" "	Included	with	Birch	1,458	5,080			
	OAK	" "	24,340	17,935	12,898	480	1,418			
	WHITE PINE	" "	80,106	987,399	561,925	{10,929	{23,863			
	RED PINE	" "	1,409	5,000	825					
	TAMARACK	" "	4,576	4,360	6,139					
	OTHERS	" "	193,474	38,458	317,120	8,574	1,140			
	TOTAL	CU. FT.	309,436	1,058,874	923,454	36,531	37,093			
LOGS	PINE	NUMBER	128,495	319,455	55,896			{17,903		
	OTHERS	NUMBER	11,345	83,957	74,663					
LOGS	PINE	CU. FT.				483M	143M			
	HEMLOCK	" "				1,778M	410M			
	SPRUCE	" "				222M	102M			
	OAK	" "				123M	41M			
	MAPLE AND BIRCH	" "					192M			
	ELM	" "				353M				
	WALNUT	" "	0	250	0					
	HICKORY	" "	1,000	350	0	2M	4M			
	OTHERS					1,894M	801M			
	TOTAL	CU. FT.	1,000	600	0	4,855M	1,693M		407M	
FUELWOOD		CORDS	135,917	156,639	86,316	51,956	26,863	33,184	24,065	24,493
SHINGLES		THOUSANDS			3,875					
OTHERS		VALUE $				955	342	535	258	5,203(3)

* In all blank spaces the item is not listed in that census
(1). Includes maple
(2). Represented entirely by "Others - Value $" below
(3). Includes fence posts, rails, railway ties, logs for lumber, pit props, etc.

M = M BD. FT.

there may be any considerable growth of masting and other timber fit for the use of His Majesty's navy".

The mast and spar export to Britain was thriving in the thirties and forties and it was continued intermittently as late as 1855. The British trade dropped off noticeably after 1854 and this may be attributed to the Reciprocity Treaty with the United States in that year, "securing the free exchange of the natural products between Canada and the United States, including timber and lumber of all kinds, round, hewed, and sawed, manufactured in whole or in part", and the building of railway connections with the United States border cities.

3. Square Timber

The square timber trade commenced, no doubt, somewhat later than the mast trade and was carried on simultaneously with it from the thirties.

Square timber was obtained by selecting large trees, mostly white pine, and squaring the best part into one long stick. In the earliest days of the industry the timbers were squared on all four sides to a fine "proud edge", but later, when the best timber had been cut, they were squared with a rounded shoulder or "wane" and were known as "waney timber". Such methods, of course, were wasteful since the finest grained wood was sacrificed in the operation, but this was the type of material called for in the British market:

> "Often only one tree in a thousand would yield a finished 'stick' (so was the heavy square timber nonchalantly called in the trade) fit for export. A good stand might yield thirty or forty trees an acre for over the whole area allowance had to be made for 'wants') - the non-bearing patches of swamp, burn, etc. Today a whole township or limit (in Northern Ontario) may not have one good square stick of the quality of the square timber of another day."*

The timbers were transported by the creek, by teams or by railway to the lake and were built into huge rafts

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* Gillies Bros. Ltd. 1942 . A Hundred Years A-Fellin', 1842 - 1942.

on which the lumberjacks built shanties and lived during the trip down to the timber coves at Quebec.

4. Saw Material

From 1800 on the cutting of timber had been one of the most important domestic businesses in most parts of Southern Ontario, and a very considerable business was carried on.

In order to convert logs into boards the first method used was pit-sawing. This was sometimes done on the bank of the river, as such procedure saved the necessity of digging a pit.

The more usual methods of pit-sawing appear to have been the digging of a pit or building of a platform with a simple but firm and strongly constructed framework. In either case the framework was made the right height for one man to stand underneath, while the other man stood above on the platform or astride the log. This hard method of sawing timber was laborious and twenty-five boards were a heavy day's work for two men; the boards were nearly always one inch thick, with planks two inches, and the occasional flooring one and a half inches in thickness.

The first power saws were a direct development of the manually operated pit saw. These were called frame, upright or muley saws and consisted of a saw set vertically in a wooden frame and moved up and down by means of a crank connected to the shaft of the water wheel.

> "Wherever a settlement is formed in America a sawmill is very soon after, if not at the same time, erected. The number of sawmills in the British colonies are inconceivable to those who are not familiarized to the rising settlements of new countries.
>
> "A sawmill is in fact a most important establishment. It not only forms a nucleus or centre to a settlement, but a first-rate sawmill, with two frames, will give employment to four first-rate, four second-rate and two third-rate sawyers, besides a measurer, a blacksmith and from thirty to forty men to prepare the timber required and

> for other requisite work connected with the establishment; twenty oxen and two horses are also necessary for hauling the timber required to streams and to other places. The boards, deals and scantlings sawed at these mills, excepting such as are required for the use of the neighbouring settlers, are rafted down the river for shipping. As fresh waters change the colour of the deals from their fresh white to a dark gray and in the eyes of prejudice, depreciate their value, it becomes an object, but one that can only be attended to occasionally to carry them down in bateaux, scows or on timber rafts."*

A study of the Census of Canada returns of forest products of farms for York County given in the table reveals the various trends and changes in the lumber industry fairly clearly.

From 1870 to 1890 much of the timber was squared and measured in cubic feet. In 1870 other products listed were firewood, staves, lathwood, tanbark, and masts and spars. Between 1880 and 1890 the peak production of nearly all items was reached and squared pine alone in York County ran to almost 3,000,000 cubic feet in 1880. In 1890 fence posts and telephone poles were added to the list of products, as were railway ties. In the census years of 1900 and 1910 square timber was still recorded in cubic feet and logs were measured in board feet; staves, lathwood, masts and spars and tanbark disappeared from production.

In 1920 no square timber is shown and logs are not even separated by species. The returns of the latest census covering the year 1940 name only one forest product and the rest are all listed together as others valued at so many dollars. The one product which has persisted throughout the records is firewood which in York County has dropped from a peak of 156,639 cords in 1880 to 24,493 cords in 1940.

One or two interesting observations with regard to individual species may also be made. Tamarack was listed regularly until 1890, after which it no longer appears, due

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* John McGregor, 1833. British America, Vol. II.

to the depredations of the larch saw-fly which almost wiped it out at this time. The returns show that some black walnut and hickory were cut each year until 1880. White pine was, of course, the species most sought after, and next to it red pine which was never abundant, though 5,000 cubic feet were cut in 1880. In 1870 and 1880 white pine and oak were the main species which were squared, but as these species became scarce more ash, elm, birch and maple were made into square timber.

5. Shingle-Making

In the history of roofing used on the Holland Watershed it is found that the first covering for human habitation on the river was the Indian elm-bark lashed roof. The first type of roof used by the early settlers was made of "scoops" which were flattened logs, usually cedar, six inches thick with one face scooped out to a depth of one to one and a half inches. These ran from the peak of the roof to the eaves, being placed alternately so that one scoop had the scoop side up and the next one the scoop side down, the edges overlapping the two scoops below.

The second type of covering was a rude type of shingle called a "shake". These were made with an axe or frow and were cut from pine or cedar three or more feet in length. Although not shaped they were a great improvement over the early types of covering.

Very early in the history of settlement, however, hand-made shingles were introduced. The shingle-maker would saw the logs into short lengths or bolts and split them with a frow to the right thickness. The shingle was then fastened by one end in a device called a shingle horse and by means of a heavy drawknife the shingle was tapered to an edge. This method was rapid and it has been said that a good shingle-maker would turn out from eighty to a hundred of these hand-made shingles an hour.

Up to the seventies and even later the shingle-maker continued to use drawknife and frow, but gradually in the seventies the generation of craftsmen died out and the shingle mill, where shingles were sawn, became the general source of supply.

6. Fuel and Ties

From the earliest days of settlement on the Holland Watershed to 1850, wood was the sole source of fuel supply. All species were used for this purpose, including oak and maple - though these were furniture woods as well. With the inception of the railway and steam-driven factories, the forests of the area were ruthlessly cut to feed industry.

In 1832 the Reverend Isaac Fidler, of Thornhill, wrote:*

> "In Canada we paid one dollar a cord when laid at our door. A person who is settled on a farm of his own .... obtains his fuel at small cost. If he ware able to hire a wood cutter to clear him an acre of land, he would pay twelve dollars; consequently an acre and a half would be cleared for eighteen dollars. Supposing the acre and a half to contain one hundred cords of wood, the cutting of it up for fuel, if the wood cutter boarded at the house of his employer, would be a quarter of a dollar a cord or twenty-five dollars for the whole".

With the opening of the old Northern Railway from Toronto to Holland Landing in 1852, locomotive requirements took large quantities of the best body hardwood, chiefly beech and maple.

> "Coal at that time was not to be had and the result was that hardwood was gradually becoming of some value. For cordwood the settlers usually realized from $2.50 up to $3.00 per cord, delivered at the various stations along the railway line. Railway facilities also stimulated the lumber industry."†

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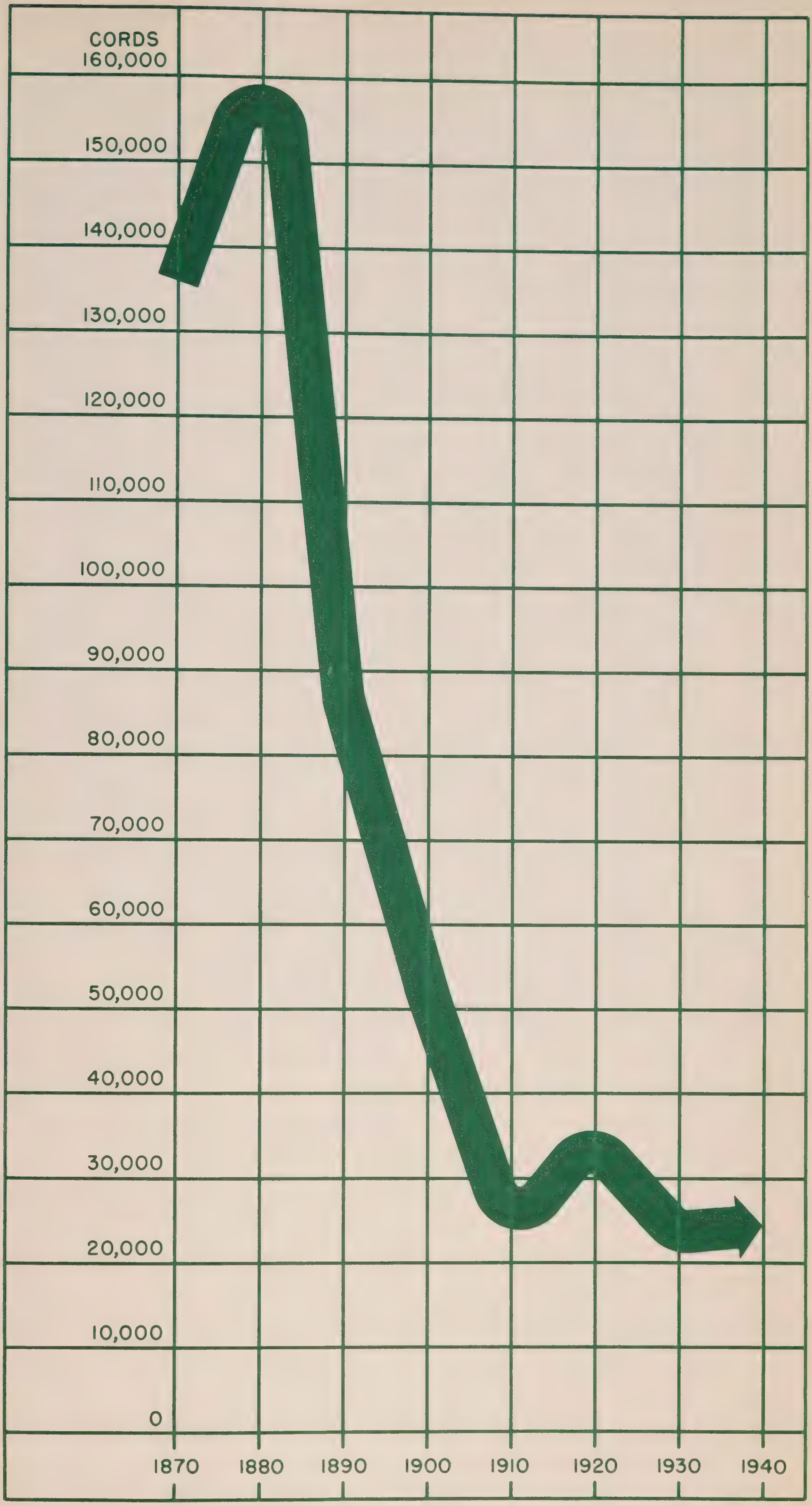
* Observations on the Professions, Etc., in the United States and Canada. 1833.

† E. W. B. Snider. Waterloo County Forests and Primitive Economics. 6th Annual Report of the Waterloo Historical Society, 1918.



FUELWOOD PRODUCTION

CENSUS OF CANADA FIGURES

YORK COUNTY

7. Road Materials and Fencing

In the early days the making of corduroy roads furnished another important wood use. The Indian trails had followed the ridges and natural conformation of the country, but when the "T-square" roads had been laid out in government offices they followed the arbitrary lot and concession lines regardless of natural contours. Many of these roads were built through swamps and in these places corduroy construction was used. Many corduroy bridges and culverts were also placed over the river and its tributary streams.

The building of plank roads - a form of highway in which the planks were laid crosswise and side by side - was done in several parts of the Province, though no records of plank roads in the Holland Watershed have come to light. Yonge Street was paved with macadam.

Much wood was also used for fencing and for this cedar from the swamps was most common. The troublesome pine stump also was used for this purpose in many parts of the Province, although in very early times it seems that it was left in the field. Around 1900 the wire fence came into use generally and thereafter a fence post industry was developed. These were cut as a rule to a standard length of eight feet, while the diameter varied greatly.

8. Woodworking and Planing Mills

During the early years of settlement in the rural districts and communities, house trim for exterior and interior use was made by the same man who constructed the frame of the house. The custom up to the fifties at least was for the carpenter to board with the family the winter before the new frame house was to be built and work all his timber into shape by hand, both for exterior and interior use.

The early carpenter also made door and window frames and all interior trim of the house by hand and for all

these products pine was the usual type of timber chosen. It would seem that doorsteps were one of the very few things for which oak was used in house building, at least up to the sixties.

Generally, as time passed, the building trades became more differentiated and more craftsmen settled on the watershed.

After the appearance of the planing mill in the fifties the end of the hand-made door and window frame was foreshadowed and much of the general carpenter's work was taken over by the mill or factory. By the 1860's the planing mill business was well under way.

9. <u>Wooden Implements and Vehicles</u>

(a) <u>Early Tools</u>

From the very early days hickory was preferred for the making of axe-halves or handles, while for beams or ox--yokes beech was used extensively and for the loop ironwood would have been selected. Spike handles were made of rock elm, white ash, hickory or ironwood; the beetle-head (a mallet used for pounding hemp and flax) was also made of ash, elm, hickory or ironwood. The hardwoods growing on the watershed were used almost entirely for making handles of implements, whereas pine was preferred for all building operations when it could be obtained.

(b) <u>Vehicles</u>

From early times the making of vehicles progressed and a carriage works operated for many years. Carts, wagons, sleighs and hay and woodracks were built by the farmers. In the building of carts and wagons, whiffle-trees, wagon-tongues and binding poles were made of rock elm, white ash, hickory and ironwood, as were also sleigh-runners and hay and woodracks. Usually the wheels or runners of these conveyances were bound with iron, although the use of metal was limited in early days since the supply had to be imported by water.

10. Indirect Products and By-Products

The three indirect products of greatest importance were potash, maple sugar and tanbark. Maple sugar furnished the staple sugar for the pioneers, cane sugar not having been procurable at that time; lye or potash was used domestically in making soft soap - almost the universal soap; tanbark was utilized by the shoemakers in dressing leather.

(a) Potash

The ashery played an important role in the drama of pioneering life. Besides communal asheries the individual ash house and the ash barrel on a platform for leaching were a characteristic of each farm in the days before the soap factory.

> "Only from the sale of potash (exported to Great Britain and the United States for the dyeing of textiles) was there money for all other requisites. The potash was laboriously produced, men, women and children sharing in the heavy work. No less than 60 large maple trees were required for a barrel of 650 to 700 pounds of potash. The ashes of the burnt wood were leached in wedge-shaped wooden troughs and this liquid was then boiled down and cooled in huge vessels or coolers where the lye solidified. Two coolers would fill a barrel. If the settler marketed this on his own, 'toting it out' to the nearest buyer for ready cash, he might get only $8.50 to $9.00, but if he could wait and accept a down payment from the traders and shippers who teamed and hauled at a season of their own convenience, he might get $10 or $12 with a possible second payment after marketing it at Montreal where a barrel might bring $30, less of course commission, risk and portage costs. The need for this pitifully hard-won money led to clearing of more land than could be cropped and not infrequently to concealing for years the fact that the holding itself might not be profitable or capable of sustaining the settlers from the growth of its poor soil."*

(b) Maple Sugar

The table shows the census figures for maple products in York County. It is interesting to note that up to 1910 production is all recorded as pounds of sugar; from 1910 on both pounds of sugar and gallons of syrup were shown, indicating the change from a pioneer necessity to the modern

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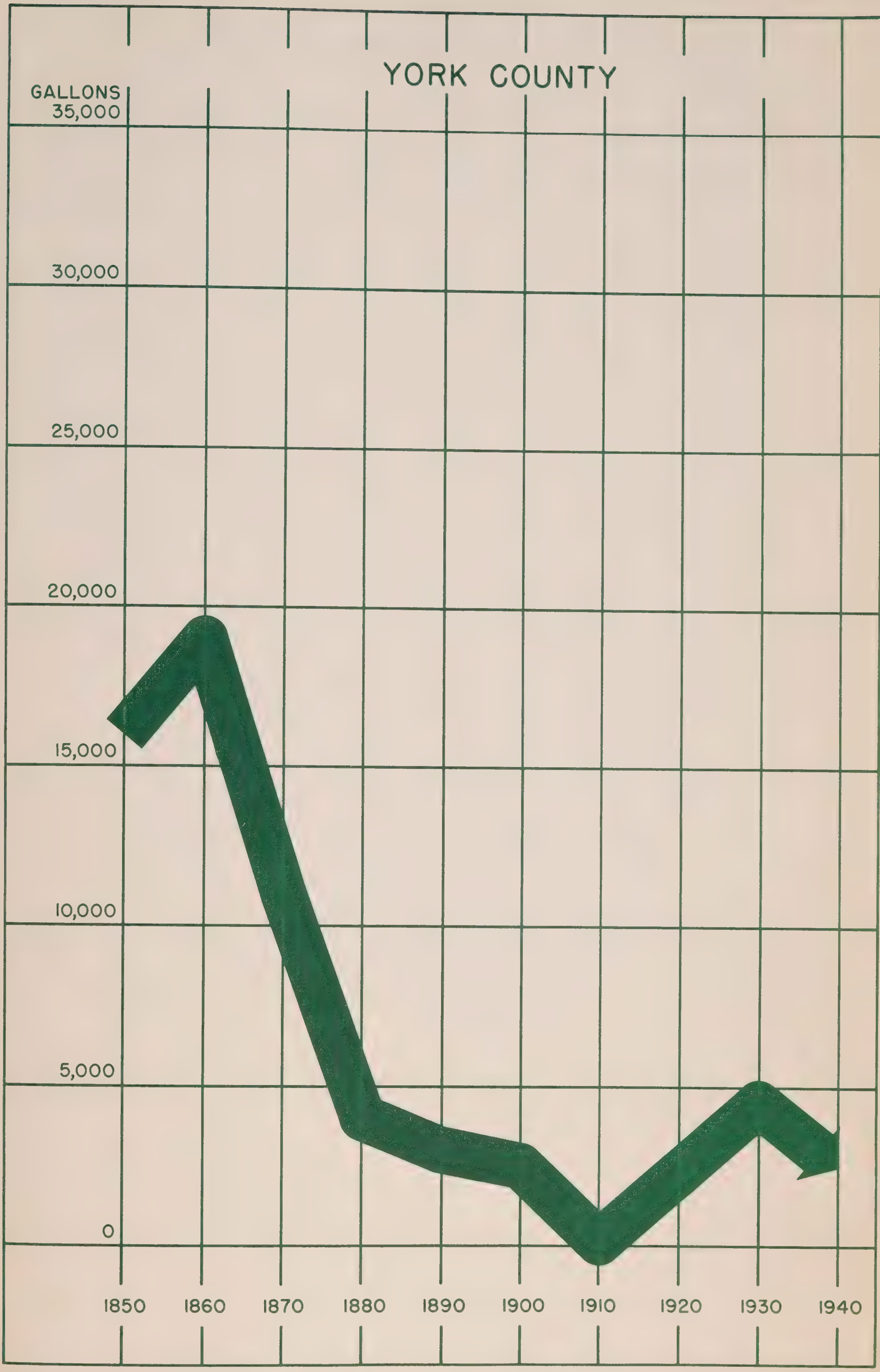
* Gillies Bros. Ltd. 1942. A Hundred Years A-Fellin', 1842 - 1942.



MAPLE SYRUP PRODUCTION

CENSUS OF CANADA FIGURES

luxury. For purposes of comparison the sugar figures have been converted to their syrup equivalents and from these, shown in the second table, it will be seen that production for York County dropped steadily from the peak of nearly 19,476 gallons in 1860 to 2,415 in 1940.

CHAPTER 3

PRESENT WOODLAND CONDITIONS

The Upper Holland Watershed lies in what is known as the Huron-Ontario Section of the Great Lakes - St. Lawrence Forest Region*, which region is characterized by a forest in which sugar maple and beech are the dominant species. With them are basswood, white elm, white ash, some yellow birch and red maple and red, white and bur oak. Small groups of hemlock and white pine occur within the association as well as a scattered distribution of large-toothed aspen, bitternut hickory, butternut, ironwood and black cherry; blue beech, slippery and rock elm, and black ash are found locally on specialized sites such as bottomlands and swamps. White pine occurs mostly on the lighter soils of the moraine and the deltate plain, as does trembling aspen where the stands have been burned over.

1. Survey Methods

Each member of the forestry party was provided with aerial photographs which were on a scale of 1,000 feet to the inch and each photograph covered an area of approximately 1,000 acres, usually a block lying between two adjacent concession roads and two adjacent side roads. Mapping was done in the field directly on the photographs.

Every area of woodland, brushland, marsh, swamp and rough land down to one acre in area was examined and notes made describing it. In the case of woodlots and plantations, detailed notes were made of their condition. Overgrazed woodlots and woodlots with very scattered trees which could be restored were classified as woodland. In short, where doubt existed as to whether an area should be classified as woodland, or not, woodland was given the benefit of the doubt.

All woodlots were grouped according to the following classification:

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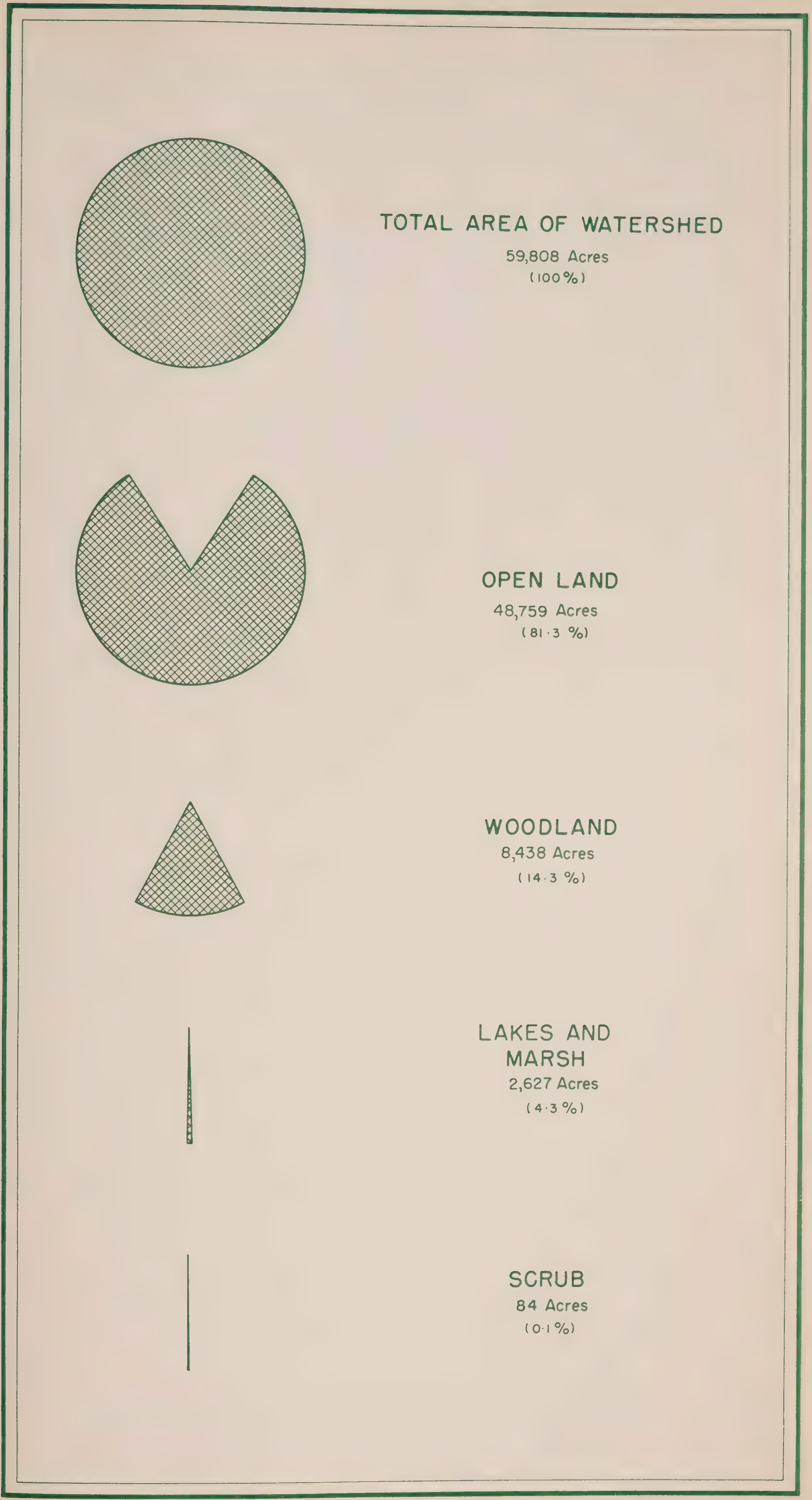
* W. E. D. Halliday. A Forest Classification for Canada. 1937.



LAND CLASSIFICATION – TOTAL WATERSHED

Diameter Breast High	Hardwood	Mixed Wood	Coniferous
Virgin	H-1	M-1	C-1
Over 18 inches	H-2	M-2	C-2
10 - 18 inches	H-3	M-3	C-3
4 - 10 inches	H-4	M-4	C-4
Under 4 inches	H-5	M-5	C-5

In this classification the term "hardwood" is used to denote all broad-leaved trees irrespective of whether the wood is physically hard or not. A hardwood type is one in which 80 per cent or more of the stand is composed of hardwood trees, a coniferous type is one in which 80 per cent of the stand is composed of coniferous trees and a mixed stand embraces all others.

Stands were also recorded according to forest cover types.* (Refer to the table, the description of forest cover types and the forestry map folded at the end of this report.)

The forestry map is on the scale of one mile to the inch and covers the whole of the Holland Watershed. It shows all existing woodland, County forests, scrub land and land recommended for acquisition by the Authority.

A forest cover type may be either temporary or permanent; for example, the present stand may be aspen which has seeded in the area following fire. Aspen seed is light like dandelion seed and is carried easily by the wind, thus it quickly covers large areas; also it is not exacting in its soil requirements and may be the only species which will grow under the soil conditions existing at the time. The fact of its growing and dropping its leaves on the ground gradually improves the condition of the soil so that more exacting

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* Forest Cover Types of the Eastern United States. Report of the Committee on Forest Types, Society of American Foresters. 1940.

Due to cutting, burning and pasturing, most of the sandy soils where the woods have survived are covered with small poplar. Such stands occupy 34 per cent of the wooded area.

In some places the poplar is attaining a fair size and may be cut for crating, basket bottoms and pulpwood.

White cedar occupies much of the valley bottoms making up 10 per cent of the total woodland. It provides a valuable crop of posts and poles.

species can grow. In addition its light shade frequently provides the correct light conditions for better species to get a start. As it is a short-lived tree, it will die early and the other species will dominate the area. This succession may be carried through two or more stages until the species best suited to the area or best able to maintain itself on the area takes over; this is called the forest type or climax type, as distinguished from the forest cover type which is the type occupying the ground at the present time. The most common forest type on the Holland Watershed is beech - sugar maple.

No classification of forest cover types has been made in Canada for Southern Ontario, so the system used is a slightly modified form of that drawn up by the Society of American Foresters, which covers the whole of the eastern United States; consequently there are many types in their classification which do not enter Canada and this accounts for the gaps in the numerical listing of types occurring in the Holland Watershed. The forest cover types of the Holland Watershed may be listed as follows:

Number	Name
4	Aspen
6	Paper birch
9	White pine
11	Hemlock
13	Sugar maple - basswood
14	White cedar
24	Sugar maple
25	Tamarack
26	Black ash - white elm - red maple
51	Red oak - basswood - white ash
57	Beech - sugar maple
60	Silver maple - white elm
60A	White elm
88	Willow

FOREST COVER TYPES

Township	No. of Woodlots	Area Acres	4	9	11	13	14	24	25	26	51	57	60	60A	88
Gwillimbury E.	71	2,739	1,899	94			69	167			5	438	8	59	
King	42	1,100	57			106	49	190				674	5	19	
Uxbridge	5	54					5					49			
Whitchurch	160	4,545	902	18	14	27	387	476	4	71		2,096	411	111	28
Total	278	8,438	2,858	112	14	133	510	833	4	71	5	3,257	424	189	28
Per Cent			33.9	1.3	.2	1.6	6.0	9.9	-	.8	-	38.6	5.2	2.2	.3
Rank by Area Occupied			2	8	11	7	4	3	13	9	12	1	5	6	10

WOODLAND CLASS

Township	No. of Woodlots	Woodland Class									
		H2	H3	H4	H5	M3	M4	M5	C3	C4	C5
Gwillimbury E.	71		26	2,023	240	40	273		25	108	4
King	42	6	85	692	14	7	210			60	26
Uxbridge	5		37	10	7						
Whitchurch	160	6	1,132	2,039	204	54	857	36		212	5
Total	278	12	1,280	4,764	465	101	1,340	36	25	380	35
		Total Hardwood 6,521				Total Mixedwood 1,477			Total Coniferous 440		
Per Cent		.1	15.2	56.5	5.5	1.2	15.9	.4	.3	4.5	.4
		Total Hardwood 77.3				Total Mixedwood 17.5			Total Coniferous 5.2		

Type 4: Aspen

Aspen is a pioneer type coming in after fire or overgrazing. Though it avoids the wettest swamps it does grow on soils that are wet throughout a good part of the year, as well as on dry soils. Its associates may be white elm, paper birch, red cherry and balsam poplar, with occasionally large-toothed aspen and green ash. It forms nearly 34 per cent of the woodland of the watershed, with extensive stands occurring on the poorly drained areas adjacent to the Holland Marsh.

Type 9: White Pine

White pine typically occurs on fresh, sandy loam upland but also on clay, in swampy areas and on loamy sand. On sandy soils on the moraines it tends to be permanent, but on heavier soils it is usually succeeded by sugar maple - beech - red oak - basswood - white ash, white pine - red oak - white ash, white pine - hemlock, sugar maple - basswood, or white oak.

Its associates on light soils are aspen, red maple, pin cherry and white oak; on heavier soils yellow birch, black cherry, white ash, red oak, sugar maple, basswood and hemlock. It was never very abundant on the watershed but now occupies less than 2 per cent of the wooded area.

Type 11: Hemlock

This type occurs mostly in widely scattered bodies in cool locations, moist ravines and north slopes, frequently in the sugar maple - beech type. Its associates are beech, sugar maple, yellow birch, basswood, red maple, black cherry, white ash, white pine, paper birch and red oak. It makes up only 14 acres of the remaining woodland of the Upper Holland Valley.

Type 13: Sugar Maple - Basswood

This was a fairly important type but many woods have been converted to Type 14 by the removal of the basswood,

leaving the less valuable maple. Its associates are white elm, green ash, yellow birch, white pine and red oak with ironwood and blue beech as subordinates. Only 133 acres exist.

Type 14: Sugar Maple

This type undoubtedly originally covered a considerable part of the watershed but since it occupied fertile, well-drained soil with good moisture much of it has been cleared for agriculture. A small proportion of other species such as yellow birch, white ash, red and white oak may be present. Today it covers only 6 per cent of the wooded area. Its area may have been increased in recent years by the removal of beech from Type 57 and basswood from Type 13.

Type 24: White Cedar

The associates of this type are tamarack, yellow birch, paper birch, black ash, red maple, white pine and hemlock. It occurs on sites of slow drainage which are not strongly acid, including the muck soils of the watershed, and is also present on poor pasture land and bottomland. It forms almost 10 per cent of the woodland and is the chief source of fence posts and poles.

Type 25: Tamarack

Tamarack occurs in muck swamps with little or no drainage, associated with white cedar and less commonly with red maple, black ash and aspen. The trees are small and have grown since the near-extinction of the species in the early part of the century. Fairly extensive areas existed in the past but today it occurs on 4 acres.

Type 26: Black Ash - White Elm - Red Maple

This type occupies moist to wet soils in swamps gullies and small depressions. Its associates are balsam poplar, yellow birch, with sometimes white pine, tamarack, white cedar, basswood and bur oak. It covers less than 1 per cent of the woodland.

Type 51: Red Oak - Basswood - White Ash

Associated with the type species are red maple,

Most of the better soils of the watershed were covered with a beech - sugar maple forest and a good deal of it still remains. These should be carefully managed for optimum production of timber.

The Carolina poplars planted in the blow hole on the left have entirely stopped the wind erosion which used to cover the road with a drift of sand at this point.

yellow birch, aspen, sugar maple, paper birch and beech on less well-drained soils. This is a relatively unimportant type, there being 5 acres in the watershed.

Type 57: Beech - Sugar Maple

This is regarded as the typical association of the climax with red maple, white oak, red oak, hemlock, white elm, red elm, basswood, shagbark hickory and black cherry. This type was undoubtedly very extensive in the Upper Holland Watershed but, because it occupied the best land, its area has been tremendously depleted. However, it still comprises over 39 per cent of the remaining woodland and is the most common type.

Type 60: Silver Maple - White Elm

This is a type of poorly drained soils unsuitable for general farming unless completely and adequately underdrained; for this reason it and the similar white elm Type 60A have survived on poorly drained land. Associated species are red maple, slippery elm, cottonwood, white, red and green ash, bur oak and bitternut hickory. This type represents 5 per cent of the woodland of the watershed.

Type 60A: White Elm

Type 60A is very similar to the silver maple - white elm Type 60, but is found on drier sites as well as swamps and swales and its associated species are the same. It is not listed in the American classification but has been introduced here because of its frequent occurrence in Southern Ontario. It comprises over 2 per cent of the woodland.

Type 88: Willow

Several species are included in this type, but the commonest is black willow. It occurs on wet sites, often on the margins of kettles, and includes only 28 acres on the Upper Holland Watershed.

The large map shows the distribution of all types throughout the watershed and from it the following observations may be made:

WOODLAND CONDITION (ACRES)

Township	No. of Woodlots	Area	Aged		Grazed		Fenced		Reproduction			
			Even	Uneven	Yes	No	Yes	No	A	B	C	D
Gwillimbury E.	71	2,739	352	2,387	632	2,107	67	2,672			715	2,024
King	42	1,100	71	1,029	283	817	263	837		154	581	365
Uxbridge	5	54	5	49	47	7		54			7	55
Whitchurch	160	4,545	698	3,847	2,313	2,232	777	3,768		1,010	676	2,859
Total		8,438	1,126	7,312	3,275	5,163	1,107	7,331		1,164	1,979	5,295
Per Cent			13.3	86.7	38.9	61.1	13.1	86.9		13.7	23.3	63.0

(a) Sugar maple types are by far the most abundant types in the watershed and constitute over 46 per cent of the woodland area.

(b) Aspen poplar, largely on the poorly drained soils surrounding the Holland Marsh, accounts for another 34 per cent.

(c) White cedar along the streams and in small depressions makes up 10 per cent.

(d) Elm types, mostly on poorly drained soils, cover about 7 per cent of the wooded area.

2. Present Conditions

The results of the forest surveys are summarized in the accompanying table.

Woodland within the watershed comprises 8,438 acres, which is 14.1 per cent of the total area of 59,808 acres. The total number of woodlots examined was 278 which includes many areas which are considered by their owners as constituting a single woodlot but which, because of the difference in types and age classes of certain sections, had to be considered in the field as separate units. Conversely, where property boundaries were not marked, woodland extending across two or more properties was sometimes considered as a unit because the type and age class remained constant throughout.

The conifers occurring in the watershed are white pine, red pine, hemlock, white spruce, balsam, white cedar and tamarack. Red pine occurred in the original forest and there is a small stand of fairly large trees in the park at Holland Landing. White pine is not plentiful but is found throughout the watershed. Hemlock is mixed with hardwoods in cool locations, and white cedar and tamarack are present in the swamps. There is no doubt that conifers formed a larger part of the woodland than they do today, but their numbers have been diminished because of the desirability of the lumber they furnish and recurrent fires have destroyed them, while more fire-resistant species have survived. The situation at the present time is that of the 8,446 acres of woodland, 77.3

WOODLAND CONDITIONS BY TOWNSHIPS

1952

per cent is classified as pure hardwoods, 17.5 per cent as mixed woods and 5.2 per cent as pure conifers. In the 77 per cent classified as hardwoods 0.1 per cent is over 18 inches in diameter at breast height, 15.2 per cent is 10 to 18 inches, 56.5 per cent is 4 to 10 inches and 5.5 per cent is young growth under 4 inches in diameter at breast height.

In the mixed wood classes, comprising 17 per cent of the woodland, 1.2 per cent is 10 to 18 inches in diameter at breast height, 15.9 per cent is 4 to 10 inches and 0.4 per cent is young growth under 4 inches. In the coniferous woods 0.3 per cent is second growth, 10 to 18 inches at breast height, and 4.5 per cent is 4 to 10 inches in diameter and 0.4 per cent is under 4 inches.

For the whole area the percentage of uneven-aged stands is 87 per cent and that of even-aged stands 13 per cent.

Grazing in farm woodlots is still fairly general, though less than in most other watersheds, the percentage of grazed woodland being 39 per cent for the whole watershed.

Fire is a serious factor menacing woodlands and especially plantations in the Upper Holland Watershed, and all landowners should have a knowledge of its effects. It is not necessary to burn a tree to kill it: merely raising the temperature of the growing layer inside the bark to 150 degrees Fahrenheit will do the job, and this is frequently what happens.

Due to the custom of grazing in the woodlots some stands have become open and require some planting. Of the areas examined 63 per cent are devoid of natural regeneration and 23 per cent require some planting to bring them back to fully stocked stands.

To sum up, all the woods are second growth with a mixture of large trees in some areas, and of these

6 per cent are young growth, the former ranging from 30 to 50 feet in height. The woodlots containing the largest trees are composed of old hardwoods, elm and soft maple in the swamp areas, with some sugar maple and beech on dry sites.

CHAPTER 4

CONSERVATION MEASURES IN PROGRESS

A considerable portion of the soil of the Upper Holland Watershed is of a light, sandy nature ideally suited to reforestation purposes. Some natural woodland has been retained on these lands and fairly extensive plantations have been set out by the County of York and private owners with a view to rehabilitating part of the remainder.

For forestry purposes the Ontario Department of Lands and Forests has divided Southern Ontario into forest districts and the forest districts into zones, each with its Zone Forester and assistant, whose duty it is to give advice and assistance to private individuals and municipalities on the management of their woodlands and the establishment of plantations. The Zone Forester covering the County of York in which the Upper Holland Watershed lies is located at Maple.

The watershed is about equidistant from the Provincial Forest Nurseries at Midhurst, five miles north of Barrie, and Orono, five miles north of Newcastle on Highway No. 2. These nurseries were both established in 1922 and have served as production and distribution centres for trees ever since. In addition they both have a number of excellent demonstrations of forest plantings of different species and mixtures on a range of sites.

1. Private Planting

Reforestation, combined with the protection of natural woodlots, is essential if farmers are to have sufficient woodland to supply the local community with fuelwood, fence posts and poles, and to have a few saw-logs for sale which will provide a cash crop at times when the prices of other farm products are depressed. Reforestation of certain areas will not only mean that the land will be producing a crop where little or nothing of value is growing now, but it will also provide adequate protection for the soil from wind

and water erosion and will retard run-off of water from melting snow and rain, thus making for a more even stream flow throughout the year.

The free distribution of trees for reforestation and windbreak planting was first begun in 1905, and for 19 years any quantity could be obtained free for this purpose. In 1924 it was decided to supply free trees up to a maximum of 3,500 for reforestation and 500 for windbreak purposes, and a charge of $4 per thousand was made for trees in excess of these amounts on each order. This policy continued till 1931, when any quantity ordered was again supplied free of charge. Following the end of the war in 1945, the demand became so great that the nurseries were unable to fill it, and for a number of years only a portion of each large order was filled. In 1953 the Department of Lands and Forests was authorized to again make a charge for trees, and at the present time the rate is $10 per thousand for all species except Scotch pine, for which $14 per thousand is charged.

In 1906 a statute was passed which permitted a township council to exempt a part of the woodland of a farm from taxation; it provided that exemption be extended to any part of a farm used for forestry purposes or being "woodlands"; provided that such exemption shall not be greater than one acre in ten acres of such farm and not more than twenty acres held under a single ownership.

> " 'Woodlands' for the purpose of this paragraph shall mean lands having not less than four hundred trees per acre of all sizes, or three hundred trees, measuring over two inches in diameter or two hundred, measuring over five inches in diameter (all such measurements to be taken at four and one-half feet from the ground) of one or more of the following kinds: White or Norway Pine, White or Norway Spruce, Hemlock tamarack, oak, ash, elm, hickory, basswood, tulip (White wood); black cherry, walnut, butternut, chestnut, hard maple, soft maple, cedar, sycamore, beech, black locust, or catalpa, or any other variety which may be designated by Order-in-Council, and which said lands have been set apart by the owner with the object chiefly, but not necessarily solely, of fostering the growth of the trees thereon and which are not used for grazing livestock." - R.S.O. 1950, c.24, s. 5 (18).

In 1927 the exemption of taxation on woodland was made compulsory if applied for, and is interpreted as meaning planted as well as natural trees.

In 1938 The Assessment Act was amended to prevent the assessment being raised on land after it had been reforested and now reads as follows:

> "Land which has been planted for forestation or reforestation purposes shall not be assessed at a greater value by reason only of such planting."
> - The Assessment Act, R.S.O. 1950, c.24, s. 33 (12).

Both these Acts were designed to facilitate the planting of trees on private land and should be taken advantage of by citizens anxious to improve woodland conditions on their own property and at the same time benefit the whole community of the river valley.

Within the Upper Holland Watershed there are 40 private plantations, ranging in size from 4 to 197 acres with a total of 808 acres and in age up to 25 years. Some of these last are in need of thinning and owners should seek advice from the Zone Forester.

2. County Forests

The County of Hastings was the first in the Province to interest itself in reforestation and as long ago as 1911 appointed a reforestation committee, which was instrumental in having The Counties Reforestation Act passed, which has since been incorporated in The Trees Act. The committee also recommended * that "The Corporation of the County of Hastings purchase from the municipality of the Townships of Elzevir and Grimsthorpe certain lands containing 2,800 acres, more or less, for $200" as the nucleus of a county forest. However, no further action was taken and the Act lay dormant till 1922, when the present policy of county forests was laid down and Vivian Forest was established in

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* Minutes of the meeting of the Council of the County of Hastings, December 8, 1911.

York County. The work is done under the authority of The Trees Act (R.S.O. 1950, c.399), which provides for the purchasing of land and the entering into agreements by the County for the management of such lands. No limit as to the size of the area is stated, so that some counties have plots of a few acres while others have forests of several thousand acres. If, however, a county wishes to enter into an agreement with the Minister of Lands and Forests for the planting and management of such county-owned land, it is preferred that the county purchase not less than 1,000 acres. The agreements which are in force at the present time run for a period of 30 years, during which time the Ontario Government agrees to establish the forest and pay the cost of such items as fencing, buildings, equipment, labour maintenance, trees, etc. - in short, everything connected with the management of the forest.

At the end of the 30-year period the county has the privilege of exercising one of three options: <u>first</u>, to take the forest over from the Government and pay back the cost of establishment and maintenance without interest; <u>second</u>, to relinquish all claim to the forest, whereupon the Government will pay to the county the cost of the land without interest; <u>third</u>, the forest may be carried on as a joint undertaking by the Province and the county, each sharing half of the cost and half the profits.

It will be seen from the above summary of the agreement that all a county stands to lose on such a project is the interest for 30 years on the purchase price of the land. Also, it should be pointed out that in drawing up such a liberal scheme, it was done purposely to encourage the reforestation of land not suited to agriculture. Again, it was not the intention of the Government to have the counties stop at a minimum of 1,000 acres, as the overhead necessary on an area of this size could very easily be spread over an area of five or even ten times the size. As a matter of fact,

York County Reforestation Committee at Vivian Forest in 1924. From left to right – Morgan Baker, W. G. Scrace, W. C. Gohn, P. W. Pearson, R. Marshall.

Four members of the same committee taken near the same spot in 1938. From left to right – Morgan Baker, M.L.A., W. C. Gohn, R. Marshall, P. W. Pearson.

this is what happened in some counties where the councils have initiated a progressive reforestation policy.

This Act also provides that any city, town, village or township with a population of over 10,000 shall have all the powers, privileges and authority conferred on councils of counties, except that townships with less than 10,000 population instead of issuing debentures to an amount not exceeding $25,000 shall have power to levy, by special rate, a sum not exceeding $1,000 in any year for the purpose of providing for the purchase of land for planting and protecting the timber thereon.

The agreements which have been drawn up between the river valley Conservation Authorities and the Ontario Government to establish and manage the Authority forests are substantially the same as those made with the counties, except that the Government has agreed to pay half the cost of the land and the agreement for planting and management is to run for approximately fifty years. The Authorities pay taxes on the land, and some townships prefer this to the county agreement, where no taxes are paid.

York County now has a forest comprising 3,391 acres in a number of separate tracts, of which 478 acres lie in the Upper Holland Watershed.

3. Municipal Forests

Municipal forests are areas owned and managed by municipalities other than counties, but none have been established in the Upper Holland Watershed.

Assistance with regard to the establishment of municipal forests and the supplying of free trees is still the policy of the Department of Lands and Forests. Moreover, as provided by The Trees Act (R. S. O. 1950, c.399), it is possible for a township council to enter into an agreement with private landowners for the reforestation of their property. The agreement will prescribe the cutting conditions of all trees

planted, and such conditions will be subject to the approval of the Minister of Lands and Forests.

Provision is also made for exempting such lands from taxation and for making arrangements with the Dominion and Provincial Ministers of Labour regarding conditions of labour and payment of wages in connection with planting and conservation of such areas. - The Trees Act.

Before leaving the subject of municipally owned forests and forests which on a large scale would provide the local communities with at least a part of their livelihood it would be as well to review what is being done along these lines in other places.

In Nova Scotia there is a community living on Hammonds Plains, near Halifax, which depends entirely on wood taken from small woodlands for its livelihood. In this settlement the largest woodlot is not over 400 acres in extent, and because of the rocky nature of the soil the people are not able to augment their incomes by farming, though most families own a cow, a pig and some chickens. The wood from the woodlots is manufactured into barrels and boxes by more than twenty small mills, which are largely family-owned and -operated. The people are thrifty and industrious; they have comfortable homes, are public-spirited and extremely forest-fire conscious. This is a community which has developed naturally and yet resembles communities based on a forest economy which have been planned and established in Europe for a considerable time.

One of the most recent is the forest of Ae in Dumfriesshire, Scotland. It was established by the British Forestry Commission in 1927 and covers an area of 10,683 acres, of which 3,000 acres have been planted, 4,500 acres are scheduled for planting in the near future, 250 acres of the best land have been set aside for cultivation, and the balance of 2,800 acres is unplantable because of its altitude but is used for sheep pasture in summer.

Red Pine stands in Vivian Forest were yielding thinnings for pulpwood and pit props at twenty years of age.

A crop of pitprops taken from thinnings, for shipment to Britain in 1946.

The forest is in charge of a forester, who resides on the spot, and under him there are foremen and gangs of workers. In the first year 16 men were employed, just before the war 27 full-time employees were engaged and by 1960 about 90 men (or one man for each 80 acres) will be needed the year round for essential forest work. This does not take into account temporary employees who will be required for saw-milling, transport and other jobs. It is planned to create a forest village for the workers, embodying a church, a school, playgrounds and sportsfields. The combination of the forest and the village dependent on it is something new in Scotland and represents an important stage in the resettling of men and women in the country. The village is to be the forerunner of other similar villages, and in many parts existing villages will be revitalized by the stimulus of forest wealth.

4. Demonstration Plantations

In 1922 the Provincial Government began the policy of assisting municipalities in the establishment of small forest plantations for the purpose of demonstrating the use of trees on marginal and submarginal land. To meet the requirements for such a plot the Government required that the area be on a well-travelled road so that as many people as possible could see it, that the municipality either purchase land or use land which was in its possession, fence it, and agree to give the area reasonable protection after planting. In return the Government agreed to supply the trees and pay the cost of planting and of supervising the work when the planting was in progress. In 1932, when Government funds were curtailed, the policy governing these demonstration plots was changed, and from that time to the present the Government has not paid the cost of planting, although the other conditions governing the establishing of these plots have remained the same.

There are no demonstration plantations on the Upper Holland Watershed. The value of such plots, if well cared for, in showing landowners what can be accomplished in a very few years by planting trees is so great that every township should endeavour to establish at least one plot.

5. Demonstration Woodlots

Demonstration woodlots are privately owned areas of woodland on which the owners have agreed to follow prescribed methods of woodlot management, outlined by the Department of Lands and Forests, under the Zone Forester and to permit access to the area by interested persons. Such demonstration woodlots and the influence they exert for the proper management of similar areas contribute to the total conservation effort in any watershed, but none have been established in the Upper Holland Watershed.

6. School Forests

In order to encourage the establishment of school forests planted and cared for by school children, the Ontario Horticultural Association in 1945 organized an annual competition. Prizes are offered for the school having the best plantation and knowledge of forestry in each forest district in Southern Ontario and for provincial winners from the winners in the district. Prizes for these competitions are generously provided by the Ontario Conservation Association and private donors.

Trees have also been sent out to schools in the watershed and have been distributed to children for planting on the home farm, and many of these have been used to form shelterbelts and windbreaks, but no school forests have been established.

7. 4-H Forestry Clubs

These clubs are organized by the Ontario Department of Agriculture, assisted by the Department of Lands and Forests, and must be sponsored by an organization

interested in the improvement of woodland and reforestation.

Members must be between 12 and 21 years of age, and each member undertakes a project, such as marking a half-acre plot of woodland for thinning or reforesting a quarter-acre of land. Projects are judged annually on Achievement Day and prizes awarded; for this purpose the Department of Agriculture furnishes $3 per member and the sponsoring organization $1.50. Winners may enter the Provincial Inter-Forestry Club Competition.

To date none of these clubs have been founded in the Upper Holland Watershed.

CHAPTER 5

FOREST CONSERVATION MEASURES REQUIRED

1. Upper Holland Authority Forest

One of the most important conservation measures required on the Upper Holland Watershed is the establishment of forest areas, to be called the Upper Holland Forest, under the Conservation Authority, which will serve to protect the natural water-storage areas of the valley. Seven such areas have been defined, as shown in the accompanying table, with the acreages of woodland and cleared land in each. The one-page map shows the location of these areas and the main tributary streams to which they supply water. The names given to these areas are taken from nearby places. The large folding map in the back gives more detail, showing the present tree cover, willow scrub, hawthorn and open land within the areas. The total acreage recommended for acquisition includes natural water-storage areas and reforestation land to the extent of 3,868 acres, of which 798 have some form of tree cover, and 3,058 are open land with 12 acres covered by two small kettle lakes.

In selecting the areas which it is felt should be set aside as permanent forest areas, adjacent swampland has been included irrespective of its present vegetative cover, that is, soft maple and white elm woods have been included. In addition, adjacent woodland, particularly on slopes and covering springs, has been included. The minimum of land in the better land classes has been included, but in some cases it was impossible to omit them entirely when they occupied positions immediately above springs or on a small part of a lot which was mostly composed of a poorer type of soil.

When the forest survey was first made it was planned that certain key areas of marginal land and swamps which are important to the water economy of the watershed would be delimited and that the acquisition of these would be recommended to the Authority. This has been done in all other

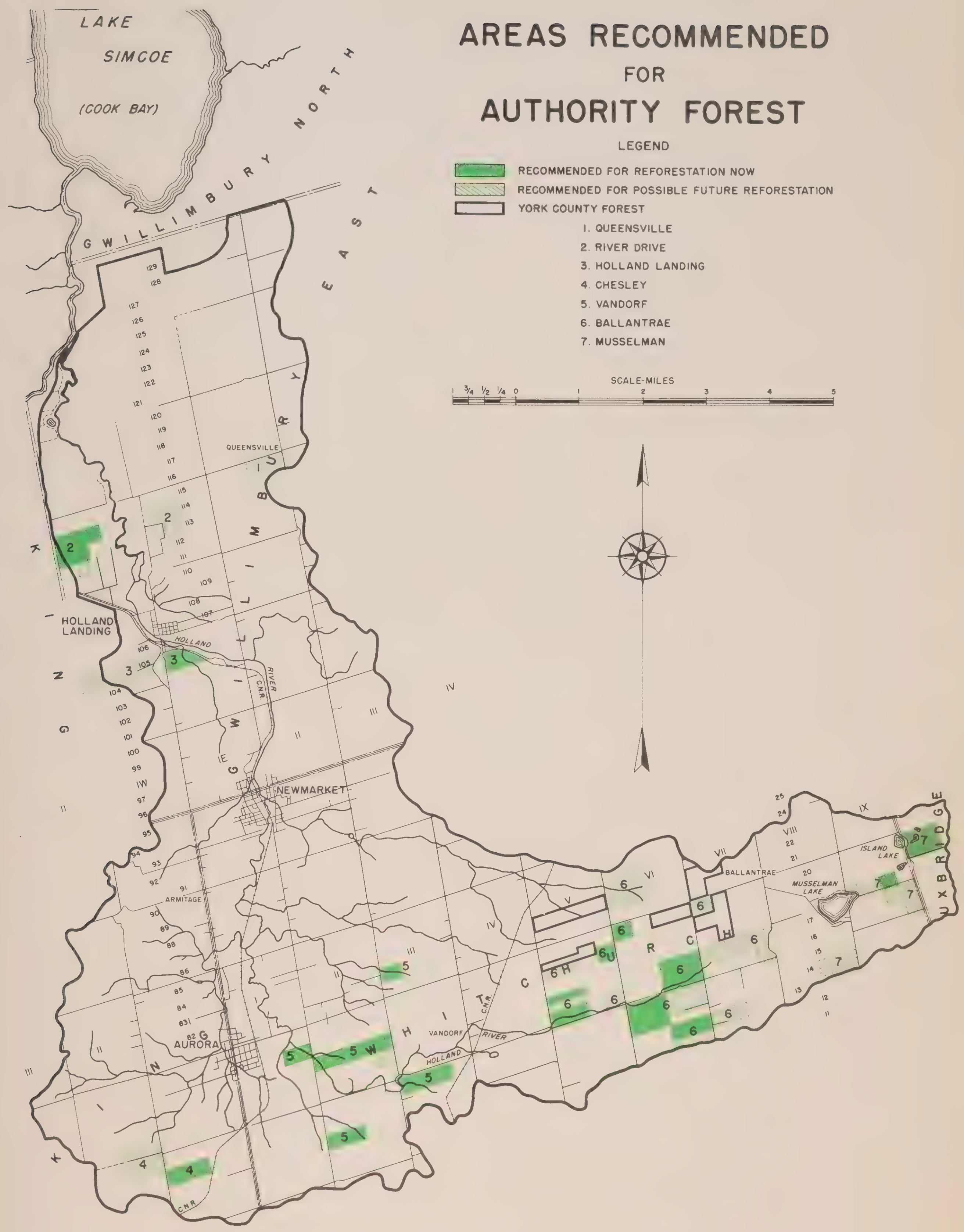
AREAS RECOMMENDED FOR AUTHORITY FOREST

LEGEND

- RECOMMENDED FOR REFORESTATION NOW
- RECOMMENDED FOR POSSIBLE FUTURE REFORESTATION
- YORK COUNTY FOREST

1. QUEENSVILLE
2. RIVER DRIVE
3. HOLLAND LANDING
4. CHESLEY
5. VANDORF
6. BALLANTRAE
7. MUSSELMAN

SCALE-MILES



RECOMMENDED AUTHORITY FOREST - ACRES

Area	Township	Con.	Lot	Open	Woodland	Total
1. Queensville	Gwillimbury E.	II	E½20	100	-	100
2. River Drive	Gwillimbury E.	I E	113,114	38	38	76
		I W	113	34	35	69
		I W	114	100	-	100
		I W	112	40	-	40
3. Holland Landing	Gwillimbury E.	I W	105	112	10	122
		I E	105	71	-	71
4. Chesley	King	II	16	28	22	50
		II	15	64	33	97
		I	74	36	18	54
5. Vandorf	Whitchurch	III	16	100	-	100
		III	22	46	9	55
		III	15	116	24	140
		II	17	40	-	40
		II	13	78	22	100
		I	79	50	25	75
		II	18	151	49	200
6. Ballantrae	Whitchurch	V	16	80	55	135
		V	17	93	12	105
		V	19	83	12	95
		VI	12	97	3	100
		VI	13	67	33	100
		VI	14	102	54	156
		VI	15	144	56	200
		VI	16	58	42	100
		VI	17	44	56	100
		VI	20	41	13	54
		VI	22,23,24	116	134	250
		VII	13	100	-	100
		VII	16	47	-	47
		VII	17	186	-	186
		VII	20	100	-	100
7. Musselman	Whitchurch	VIII	14	92	8	100
		IX	16	47	-	47
		IX	17	67	16	83
		IX	18	121	-	121
	Uxbridge	I	21	90	10	100
		I	22	91	9	100
Total				3,070	798	3,868

watersheds with considerable success. That is to say the Authorities have set up definite programs of land acquisition with the object of maintaining and improving the existing woodland and establishing plantations on the cleared land within these areas. In the Holland Watershed, however, proximity to Toronto may have raised the value of this marginal land to such a point that its acquisition will be difficult or even impossible.

It is therefore recommended that the Authority investigate in detail all the land in the seven designated areas and make every effort to secure it.

If all attempts to secure these lands should fail, then the Authority ought to work out a form of agreement to be made with the owners which will ensure that the tree cover will be maintained and restored on these lands. In such an agreement the Authority could offer to fence the lands from cattle and reforest the open areas by furnishing trees or tree-planting machines, or both; in return for which the owner would agree to remove only such trees as are marked by a forester or other competent person designated by the Authority.

(1) Queensville

This tract is 100 acres of steep land west from the village of Queensville with a difference in elevation of over 100 feet. Twenty acres of the more level land at the top are under cultivation but the slopes have been cut over and used for pasture. There is a watercourse through the property with patches which remain wet throughout most of the year. Maintenance of pasture is impossible and the area should be reforested.

(2) River Drive

The River Drive tract includes two areas of level deltate sand near the Holland River north of Holland Landing. One of these is Crown land east of the river covering

Hilly land is typical of the country around Musselman's Lake where the Holland River rises. Much of the land is best suited to trees. Here are natural woods, plantations and stumps, relics of the pine which once grew on this soil.

Much of the land near Ballantrae is sand and subject to wind erosion. Tree cover will prevent this and improve water relationships.

Near Holland Landing are large areas of deltate sands which should be reforested.

76 acres, 38 of which are wooded, mostly with poplar and a little red pine. The other lies west of the river and includes 209 acres in which there are 113 acres of small poplar. None of this land is being used for either cultivation or pasture and would be excellent for tree planting.

(3) Holland Landing

The Holland Landing tract is on the hilly land south of the village on both sides of Yonge Street. It includes 193 acres with 10 acres of maple - beech woods and the remainder open land on which considerable erosion is taking place. There is a small stream at the east end of the area which flows into the Holland River.

(4) Chesley

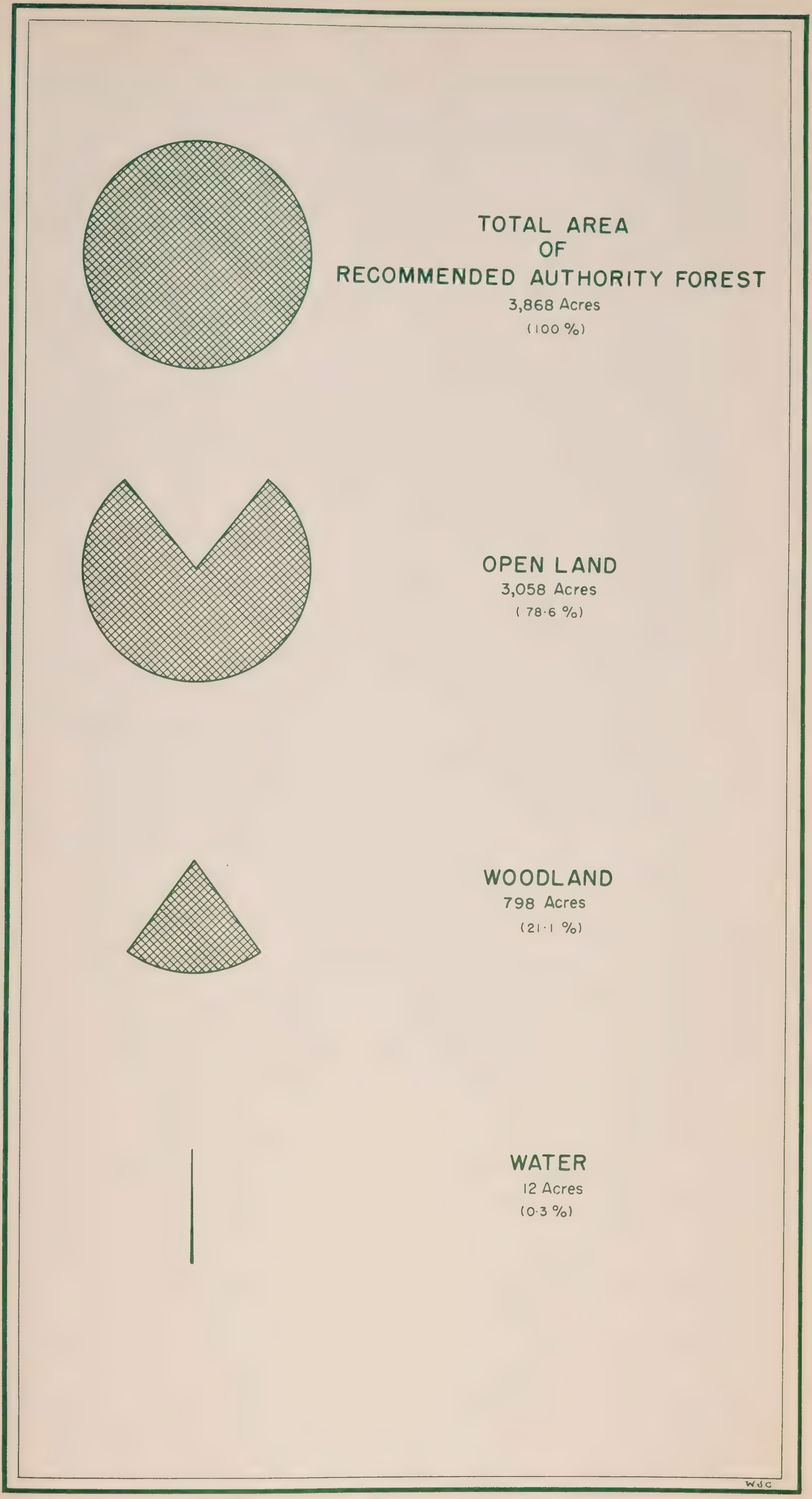
Chesley is a tract which lies at the headwaters of the Creek which flows through the town of Aurora. The land is hilly, part of it is sandy and the prevention of erosion here is of considerable importance. There are 201 acres in all, including 124 acres of maple woodland and 73 acres of open land. The maintenance of the existing bush and the reforestation of such lands as are unsuited to agriculture is vital to the regulation of flow in this stream.

(5) Vandorf

Lying to the west of Vandorf are four tracts of hilly land which have been grouped under this name. They constitute a total of 710 acres of which 129 acres are woodland and the balance run-down pasture. The woodland is for the most part elm and cedar swamp along the streams and sugar maple - beech woods on the dry land.

(6) Ballantrae

Ballantrae is the sand area lying south and west of the village of the same name where a number of blocks of land have been outlined. There are already several tracts belonging to Vivian County Forest here and some private plantations have been established, but there are, in all, some



LAND CLASSIFICATION
RECOMMENDED AUTHORITY FOREST

thousands of acres which are only suited to tree growth. Every effort should be made by the Authority to get these lands reforested. 1,828 acres are recommended for acquisition, including 470 acres of natural woodland. The preservation of the latter and reforestation of the former are essential to the conservation program.

(7) Musselman

Musselman Lake forms the headwaters of the Upper Holland River and it is from the hills surrounding it that much of the river's water is derived. The reforestation of as much of this region as is practicable is most important to the water economy of the watershed and 551 acres have been outlined on which there are at present 43 acres of bush. The hills are steep and gravelly and at present provide low-grade pasture.

2. Scrub Land

Scrub land is not a serious problem on the Upper Holland Watershed as there are only 84 acres, of which 59 acres are dry scrub and 25 are wet scrub.

Scrub land has been placed in two categories: dry-sited scrub which includes such species as hawthorn, apple and sumach, and wet-sited scrub - willow, dogwood and alder. Dry-sited scrub land is usually land which has been overgrazed and neglected for many years. The soil may be unsuited to agriculture because of poor quality, excessive steepness or inaccessibility. On the other hand, it may be fairly good farmland which the owner has not been able or willing to maintain in good pasture so that shrubs which are unpalatable to cattle have taken over the area.

Wet-sited scrub land is land with imperfect drainage, often bordering swamps. The bush has been cleared from it but the subsequent pasture has been so poor that shrubs such as willow and dogwood, which require a damp site, have invaded the area.

Frequently scrub areas of these two types are suitable only for trees and should be reforested. The wet-site areas present a problem in planting, and research should be undertaken to determine the best method of handling them. There appears to be a natural succession from neglected pasture land through willow scrub, trembling aspen, white elm and black ash to the climax types of silver maple - white elm or black ash - white elm - red maple, and every effort should be made to determine the best method of speeding up this succession.

3. Controlled Woodlot Management

Before the necessary conservation measures on that part of the watershed exclusive of the proposed Upper Holland Forest can be properly co-ordinated, some system of controlled cutting of privately-owned woodlots must be established. The reason for this is that the average owner does not take a broad view of the value of forest cover and is not interested to any great extent in what may happen to land or stream flow off his property. The result is that throughout the watershed there is a systematic cutting of woodlots for the purposes of lumber and firewood. The type of cutting has been in progress for many years, and a great deal of damage has been done in removing, particularly, young thrifty trees. The system of clear-cutting blocks of timber for fuelwood is also another vicious practice, for the reason that every tree which can be used is cut. Some system of regulating cutting would correct this situation, and certainly the areas which are connected in any way with the headwaters of streams, or the feeding of springs, should be controlled to the extent that they cannot be clean-cut.

Where conditions warrant, cutting would be continued, but should be controlled by agreement with the Authority and only such trees as are marked by a competent person should be cut. Provision should be made for re-stocking where necessary, the intention being to interfere

as little as possible with the economy of farm property where the supply of wood is concerned. County by-laws restricting cutting passed under The Trees Act do not prevent an owner from clear-cutting any area if the wood is for his own use.

For many years now conservationists have advocated controlled cutting of woodlots. In some sections, particularly in tobacco-growing counties, the destruction of woodlots for the curing of tobacco has become alarming. It is admitted that the question requires delicate handling, but where the good of the whole community is envisaged some middle road of agreement could be arrived at. Furthermore, the distribution of free trees by the Government for conservation purposes was sometimes criticized, and rightly so, where on one farm the owner planted an area with seedlings and in the same year his neighbour clean-cut a woodlot which perhaps protected the headwaters of a stream. In fact, so distorted is the relative value of plantations versus established woodlots in the minds of some people that there are examples on record where municipalities have purchased land for reforestation and have allowed the owner to cut the timber before giving title.

It is admitted, of course, that there are extenuating circumstances when a farmer may consider it necessary to raise money by selling timber. This in itself is not so serious if the cutting is done in such a way that the benefits of the forest are retained. Young forests, as well as old, protect the soil and have water-regulating value.

The basis on which a regulation of this kind should be carried out is a consideration of the woodlot concerned. To make a blanket ruling that all woodlots on the Upper Holland should not be cut, or should come under one type of control measure, would not work to the best advantage of the community and certainly would not be in the interests of good forestry.

Some woodlots have reached the stage at which they are worn out and if the land is suitable should be cleared off and cropped. Others may be composed of a high percentage of worthless species and have no relation to water regulation in the countryside, and likewise could be disposed of to advantage. But where the woodland has a direct bearing on water regulation, erosion, retarding of the wind and similar benefits, the desire of the individual should be sacrificed for the good of the community. The whole question, therefore, resolves itself into an examination of each woodlot by a competent person and the prescribing of a program of management to suit each case.

4. Fencing Woodlots from Cattle

One of the most progressive steps taken in Southern Ontario in recent years was taken by the County of Halton in 1948 when the County Council passed a by-law to aid farmers in fencing their woodlots from livestock.

The by-law states that the County of Halton will grant a sum equal to the prevailing cost price of 8-strand fence wire with a single barb (not the cost of posts or labour) to a woodlot owner who will erect such a fence on one or more sides of his woodlot in order to completely enclose the woodlot, thus fostering forest growth by keeping livestock out. The woodlot must be of a size not less than two acres and livestock must be excluded for a minimum period of ten years.

Such action by the County Council is of infinitely more value than the planting of many millions of trees artificially. Every county should pass such a by-law and it is recommended that the Conservation Authority adopt a similar scheme.

5. Diameter Limits

The basic method of control usually advocated

is cutting to a diameter limit, that is, that all trees below a certain diameter - for example, fourteen inches - should not be cut. Such a regulation may or may not be good forestry. In most cases it would not be, because there would be much worthless material below this diameter limit, such as poplar, thorn, willow and other species, which should be taken out. At the same time there would be certain large trees above the diameter limit which should be left for the benefit of the forest as well as trees suitable for reseeding the area. The diameter limit should not be a fixed rule but simply a guiding principle, a sort of yardstick on which the landowner can base his calculations. In an area the size of the Upper Holland watershed a program of individual woodlot examination should not be too heavy a burden on the Conservation Authority.

Twenty counties, including York, have passed by-laws under The Trees Act (R.S.O. 1950, c. 399) which empowers a county council to pass by-laws restricting and regulating the cutting of trees. In each case the by-law has fixed minimum diameter limits below which trees may not be cut except in special circumstances. The object of this is to prevent the cutting of trees at the time when they are putting on their greatest diameter growth. These limits are usually 5 or 6 inches for white cedar, red cedar and black locust and range from 10 inches to 16 inches in the various counties for all other species. The limits which have been set are actually far too low for the final crop trees as most trees are making their maximum diameter growth after they reach 18 inches in diameter, but it is an elementary step in the right direction. Every county should have restrictions of this type and it is recommended that similar powers be extended to Conservation Authorities as a means of protecting existing woodland on their watersheds.

6. <u>Forest Fire Protection in Southern Ontario</u>

The task of protecting woodlands from fire in Southern Ontario presents a very different problem, or rather series of problems, from those of Northern Ontario, and consequently must be handled in a somewhat different manner. Fire is a serious question on the Upper Holland Watershed and it is a question to which attention should be given at once because of the extensive coniferous plantations which have been established largely near Ballantrae.

Northern Ontario is predominantly forest land, the population is sparse, parties travelling through the forested areas are fairly readily accounted for by means of a permit system during the fire season, and watch is maintained for fire by means of look-out towers and air patrol.

In Southern Ontario, south of the Canadian Shield the land is normally potential agricultural land with the woodland surviving in isolated patches as farm woodlots or in larger more or less continuous blocks of swamp or sand up to ten thousand acres in extent. The population is, relatively speaking, fairly dense, no part of any woodland is more than two miles from the nearest human habitation and most roads are travelled by a comparatively large number of people.

In spite of the publicity given to the damage caused by fire the average person does not realize how serious this is. Though he may know that young growth and small trees are burned by surface fires he does not realize the extent of the less obvious damage such as the destruction of humus which itself preserves the condition and water-retaining capacity of the soil. When the humus and ground cover are destroyed the sun and dry winds remove the moisture required for tree growth and plant nutrients are destroyed. The heat of the fire also injures the growing tissue inside the bark of older trees which are not actually burned, exposing the wood to attack by insects and fungi. Even though through time the

wounds may be completely healed, the damage shows up as defects when the tree is cut for lumber.

Many landowners in Southern Ontario are so completely unaware of, or indifferent to, the damaging effects of fire that they deliberately set fire in peat land to burn off the peat, starting fires which it is next to impossible to extinguish. Such fires burn for months, even under the snow, destroying many acres of woodland every year, not only on the land of the person setting the fire but frequently spreading over land adjacent to it.

The first step in fire control is fire prevention, and the best assurance of prevention is an enlightened public opinion which will make every member of the rural communities conscious of the seriousness of the fire damage and of his duty as a citizen to do all he can to prevent it. The farmer can prevent most fires in farm woodlots if he exercises the same care that he does around his home and buildings.

Experience in the United States has shown that the most effective fire protective systems in rural districts are those set up under a state organization with local wardens appointed by the state forester on the recommendation of the local town* councils. In the rural parts of the State of Maine each town appoints its own fire wardens who handle fire protection in the town quite independently of other towns. This means there is a lack of co-operation between towns, wardens receive little practical training, organization is loose, and as wardens hold office at the pleasure of the town council there is a serious lack of continuity in administration.

In New Hampshire and Vermont wardens are appointed by the state forester on the recommendation of the

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* The "town" in the Eastern United States corresponds closely to the township in Canada.

council and in Vermont they serve until they resign or are removed for cause by the state forester.

Mr. H. H. Chapman, writing in the Journal of Forestry, states*: "It is not unreasonable to conclude that the ratio of 34 to 1 in damage per acre of woodland between these two states (Maine and New Hampshire) is the direct consequence of Maine's failure to depart from the 'fire bucket' principle of town organization."

From the evidence collected in the northern states of the United States, where conditions most nearly approximate those of rural Southern Ontario, it is apparent that the most effective fire protective systems are those set up under the following conditions:

(a) Where the system is organized under the direction and control of the state forester and the wardens in each town are appointed by him on the recommendation of the local council.

(b) Where wardens paid an annual retainer are actual residents in the locality. Usually they are farmers who have had practical instruction in fighting fire. They have the power to call out other local residents to help in firefighting and maintain a store of fire-fighting tools on their premises.

(c) Where the warden is assisted in his work by all members of the community. That is, his address and telephone number are known to everyone and fires are reported to him immediately.

(d) Where designated members of the community know that they are likely to be called on to fight fire and are paid so much per hour for the time they are so employed.

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* Journal of Forestry, Vol. 47, No. 2, 1949.

(e) Where every resident is thoroughly fire-conscious and realizes that loss of timber by fire is a loss to the whole community, and considers it his duty to prevent, report and fight fire.

(f) Where fires for burning brush and rubbish may be set only after a permit has been obtained from the local firewarden.

It is therefore recommended that the Authority set up a committee to determine the best method of providing fire protection for public and private lands, through the co-operation of the Department of Lands and Forests, for the protection of woodlands in the Upper Holland Watershed.

CHAPTER 6

FOREST INSECTS AND DISEASES

1. Forest Insects

In any project, such as that proposed for the Holland Watershed, careful consideration should be given to the prevention of insect outbreaks and adequate arrangements made for the immediate application of control measures when these become necessary. While it is not possible to predict accurately the course insects may take under the ever-changing conditions of a newly forested area, there are a number of fundamental principles which, if applied, will greatly lessen their destructiveness.

It is important to avoid the planting of large areas of one kind of tree, otherwise conditions will be ideal for an outbreak of abnormal numbers of some insects which prefer the food afforded by that particular host. It is preferable to plant in blocks, the blocks distributed so that trees of one species are separated by blocks of different tree species. This tends to keep outbreaks localized until natural agencies bring them under control and facilitates direct control measures if such become necessary.

It is important to plant only the species of trees suitable to the site and existing growing conditions. Healthy, vigorous trees are certainly more resistant to insect attack than weak, struggling ones.

Over-mature and dead trees should be removed from the existing stands as these harbour bark-beetles and wood-boring insects which may become excessively abundant and attack healthy adjacent trees.

Care should be exercised to prevent ground fires. Even light ground fires are frequently followed by severe outbreaks of bark-beetles and wood-boring insects.

Woodcutting operations, sawmill sites and wood storage yards should be carefully supervised or they may become reservoirs of infestation.

It is essential that surveys for insect conditions be made each year so that any abnormal increase in insect populations may be noted and control operations initiated before they develop to outbreak proportions. Serious and widespread oubreaks are frequently prevented by prompt and well-timed spraying operations over a comparatively small area. It is therefore necessary that spraying equipment be available and that laneways be maintained within the plantations for spraying purposes. Outbreaks of an extensive nature can generally be brought under effective control by strip spraying. In this method, alternate strips of trees in large plantations are sprayed, thus reducing the initial infestation and at the same time causing the native parasites to concentrate and build up in the unsprayed portions. This reduces spraying operations and the number of lanes required for the passage of spraying equipment.

Owing to the danger of injury by the white pine weevil, white pine should not be planted in pure stands unless the stands are very densely stocked in a good site. It is better to grow white pine in mixture with some immune species such as the better hardwoods. The protecting species should be taller than the white pine, at least in the early years.

In conclusion, it should be recognized that protection against leaf-feeding insects is very desirable, since defoliation of a tree weakens it and thus makes it more susceptible to attack by bark-beetles and wood-boring insects as well as by organisms which do not usually attack healthy trees but which will hasten the death of weakened trees. Leaf-feeding insects alone may kill a thirifty, broad-leaved deciduous tree by completely defoliating it for three years in succession. Conifers, however, are usually killed as a result of one complete defoliation.

2. Tree Diseases

Productive woodlands require protection against fire, trespass, grazing animals and rodents, insects and disease

Protection is a part of forest management, and under a policy of sustained yield will be maintained in continuity. Good forest management is reflected in the health of woods and, conversely, damage on account of disease is often a sign of mismanagement or neglect. In general, an objective of maximum yield, with attendant intensive silviculture, is compatible with, and often facilitates, protection and disease control.

For the purpose of discussing their pathology and protection, the hardwoods may be considered separately from pine in natural stands or plantations. The chief diseases of the hardwoods are the various trunk, butt and root rots, and chronic stem cankers, which are all endemic and may cause serious damage under aggravating conditions. Woodlots on the Holland Watershed present very diverse conditions with respect to the incidence of these diseases, a circumstance which is usually related to their past history. Thus many containing old timber are in need of heavy preliminary salvage and sanitation cuttings as a result of mismanagement or neglect. Such cuttings should precede or be combined with cleanings and improvement cuttings, designed to improve the composition and structure of the stands. Having established a sanitary condition, normal care should maintain it and obviate loss on account of decay.

The wood rots are commonly thought of as diseases of mature and over-mature timber, but experience has shown that infection may occur at a very early age. In hardwood sprouts the stem may be infected from the parent stump. In older trees infection is chiefly through wounds, either of the root or trunk, which may be caused by fire, trampling by animals, insects, meteorological agencies, or by carelessness or accident in felling and other woods operations.

Hardwoods are commonly cut selectively and not infrequently in clear fellings. Few foresters will approve the latter system, which is in fact often intended as a liquidation of the property. A system based on yearly

selection, or frequent periodic return to conveniently planned subdivisions, has obvious advantages for small woods, and is well adapted to the control of decay.

For many reasons "cleanings" in the reproduction are desirable, especially where the woods have been heavily cut. While favouring the valuable species, those sprouts which, on account of decay hazard, are of undesirable origin should be eliminated. Such will comprise sprouts from the larger stumps and those from above-ground position.

In harvest cuttings, which should recur at frequent intervals, the permissible volume allotted should include trees in which incipient decay is discovered and so far as possible those which have become a poor risk through injury or other circumstances.

White pine is found in young plantations and in natural stands, almost pure or mixed with hardwoods. From the latter stands it tends to disappear on account of hardwood competition, except on sites which are particularly favourable for its reproduction. The white pine blister rust, which with the well known shoot weevil is a principal enemy of the species, is a factor contributing towards the elimination of seedlings and young trees.

White pine should be encouraged on those sites which are naturally suited to its reproduction so that fairly compact growth may be secured, thereby facilitating the protection problem. It is an important and valuable species in Southern Ontario, and its cultivation should be promoted by the institution of effective blister rust control facilities.

CHAPTER 7

LAND ACQUISITION

The problem of land acquisition in any part of agricultural Ontario, where practically all the land is privately owned, is one which requires careful approach. The ownership and use of land, especially for agricultural purposes, is considered by most citizens as one of their few remaining inalienable rights. However, where the good of the whole community is under consideration, such personal rights should be and have been overruled under the principle of eminent domain. Examples of such cases are the building of highways, the construction of power lines, and the acquiring of land for military purposes in the event of a national emergency.

In Southern Ontario compulsion has not been exercised to any great extent by the Government in planning proper land use schemes. But who would gainsay the fact that the acquiring of poor land on the Upper Holland Watershed for conservation purposes constitutes a national emergency, and therefore requires a more permanent authority than the individual to bring it back to its proper use.

However, in dealing with land acquisition it should not be the desire of any Authority to approach the problem in a dictatorial manner. It will require careful handling, and as a preliminary step in such work the people of the area should be acquainted with the purpose of the scheme, its ultimate benefits to the community, and by explanation and demonstration be gradually brought to the point where they will be glad to co-operate.

The only part of the Upper Holland where large-scale transfers of property from private ownership to a forest authority would have to be made is in those areas which are recommended for acquisition because they are natural water-storage areas and reforestation land.

1. Methods of Acquiring Land

There are several ways in which land can be acquired and controlled for conservation purposes, and it is proposed to enumerate and discuss these briefly in this section.

(a) Transfer by Private Sale

The most satisfactory method of acquiring land is by private sale between the Conservation Authority concerned and the landowner. This method has been followed by the other Conservation Authorities of Ontario in purchasing land for reforestation work in building up the system of Authority forests, which totals in round figures 10,000 acres. The county forest system has been built up in a similar way and totals 90,000 acres. This method has its drawbacks, however, as individuals who have not the community's welfare at heart, or for one reason or another have an exaggerated idea of the value of their property, may block the completion of a unified area by refusing to sell. This will be overcome in time in most cases as the Authority can afford to wait until the land may be purchased at a reasonable figure even if it has to wait fifty years.

(b) Maximum Price per Acre

Another method which has been used has been to fix a maximum price per acre for this class of land, beyond which the forest authority is prohibited to go, allowance being made for the presence of good fencing and buildings on the properties, which in some cases have been removed by the vendors and allowed as part payment for the land.

(c) Agreements

Where owners of property prefer to retain their woodlots, or where parts of farms fall within the forest area prescribed, and providing the retaining of ownership does not jeopardize the complete conservation scheme, agreements could be made for the control and management of such areas.

This method has been adopted by the Dominion Forest Service in Nova Scotia, where it has been desirable to control wooded areas for experimental and conservation schemes, and in this particular case the agreements cover a period of twenty years.

In Ontario there is one example, at least, where a municipality leased a part of a farm for reforestation work for fifty years, and one United Counties' council has adopted the plan of taking easements on land for the same purpose.

(d) Control by Existing Legislation

Under the authority of the Private Forest Reserves Act (R.S.O. 1950, Chapter 288), the Minister of Lands and Forests, on recommendation to the Lieutenant-Governor in Council, may, with the consent of the owner of any land covered with forest or suitable for reforestation, declare such an area to be a private forest reserve. When such an arrangement is made the Minister or his representative may reforest such areas, supervise the improving and cutting, and prohibit the removal of trees by the owner without his consent, and also prohibit the grazing of the area by cattle.

(e) Life Lease

Many of the farms on the proposed forest, as already mentioned, are of low agricultural worth and are supporting families at the present time. The problem in such cases is not so much the purchase of the property as what will become of the family after the farm is acquired. In almost every case it would be impossible for the vendor to purchase another farm with the money he receives, except one which is of approximately the same value outside the forest. In some cases such farms are occupied by older people whose families have grown up and left the community. The removal of these from their properties might work undue hardship on them, and in fact in some cases they might become a burden on the municipality. With some of these the plan of giving the

vendor a life lease would be sufficient. In most cases such old people make little attempt at farming the whole property, but require only sufficient pasture for a cow or two, enough land for a garden, the house and buildings, and a supply of fuelwood. The plan of giving a life lease has been adopted in the case of two properties,* at least, on the county forests in Ontario, and has proved satisfactory to both contracting parties.

(f) Tax Delinquent Land

Under the Statutes of the Province of Ontario, † land which becomes tax delinquent is sold by the County Treasurer. In the case of a farm this is not done in practice until the land has been in default for three, or in some cases, four, years. Even then the owner has the privilege of redeeming his property within a year. Where such lands are marginal or submarginal, they are sometimes bought for only a part of the area which is of special value, such as woodland, old buildings, or a good field or two. In some instances the poor land remains idle and frequently appears again at the tax sale. The fact that such land becomes tax delinquent is an indication in many cases that its ultimate use is forestry. Under the present Statutes the municipalities are not permitted, at the first sale at least, to acquire or reserve such land for conservation purposes. Consequently this report recommends that the Authority expropriate all tax delinquent land subject to the regulations of the Municipal Act.

(g) Expropriation

As a last resort in land purchases, or where the owners of abandoned land cannot be located, such areas can be acquired by expropriation. The Conservation Authorities Act, R.S.O. 1950, Chapter 62, Section 15, states:

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* Northumberland Forest and Angus Forest.

† The Assessment Act, R.S.O. 1950, c. 24, s. 143.

"For the purpose of carrying out a scheme an authority shall have the power to purchase or acquire, and without the consent of the owner enter upon, take and expropriate any land which it may require and sell or otherwise deal with such land or other property."

Also, under The Forestry Act (R.S.O. 1950, Chapter 147, Section 13) provision is made for the removal of settlers from lands unsuitable for farming. To quote:

"Whenever in the opinion of the Minister, it is found that settlement has taken place on lands not suitable for agricultural purposes, and which said lands are required for forestry purposes, the Minister shall have the power to make arrangements for the removal of such settlers upon such terms as may be agreed upon."

As a matter of general interest, it should be stated that this Act also provides for the power to close the roads on lands taken over for forestry purposes, the setting apart of lands for settlement, and the removing of settlers from lands unsuitable for farming. It should also include, however, provision for acquiring permanent or community pastures, and pondage areas where these are required, as an integral part of a large conservation project.

2. Cost of Land in the Proposed Authority Forest

It would be impossible to give an accurate figure for the total purchase price of all land in the proposed forest without consulting the owners of the individual parcels. However, all properties recommended for reforestation have been examined in the field and reports concerning each one and including assessment figures have been prepared which are available to the Authority. As an indication for arriving at the approximate cost the amounts paid by York County in purchasing land for Vivian Forest in Whitchurch Township will serve as a guide.

TABLE SHOWING COST OF LAND PURCHASED FOR VIVIAN FOREST
IN WHITCHURCH TOWNSHIP

Year	Area in Acres	Price $	Cost per Acre $
1924	597	11,388	19.07
1925	470	4,995	10.62
1930	70	950	13.29
1936	20	400	20.00
1937	10	125	12.50
1938	50	400	8.00
1939	84	950	11.31
1943	50	600	12.00
1945	190	4,000	21.05
1946	250	5,370	21.48
1947	355	7,800	24.85
1948	154	3,090	20.05
1950	100	3,000	30.00
Total	2,400	44,068	(Av.) 17.95

CHAPTER 8

WINDBREAKS

In the process of clearing land for agriculture woodlots and belts of trees along fence lines have been removed which had served as natural shelterbelts. The restoration of these in the form of windbreaks is essential to a complete conservation program in many parts of Southern Ontario. E. I. McLoughry* in referring to Waterloo County states:

> "Forests and windbreaks of the county have been removed to such an extent, and the organic matter removed to such a degree, that soil drifting has become a serious problem in many areas...The policy we recommend in regard to windbreaks is to encourage the planting of desirable trees."

When proper species are used and windbreaks are correctly placed the effects are almost entirely beneficial. The effects may be direct or indirect, but in either case are the result of reduction in wind velocity. The effects of windbreaks on crops and cultivated fields may be listed as follows.

(a) Direct Effects

(1) Wind damage and lodging in small grains and corn is reduced or eliminated.

(2) Snow and the resultant moisture are more evenly distributed over fields, particularly on the higher spots where they are required most.

(3) Wind erosion of the soil is minimized.

(b) Indirect Effects

(1) Moisture loss by evaporation is reduced.

(2) Temperatures in the fields are raised, which may prevent frost damage, accelerate growth and even lengthen the growing season slightly.

(3) Erosion of the soil by water may be reduced by its more even distribution when released from snow.

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* E. I. McLoughry. Proper Land Use Program of Waterloo County. 1950.

The benefits of windbreaks to buildings in reducing heat loss in winter have been shown to be considerable. Experiments conducted in the United States proved that more than twice as much heat is lost from a house, per day or per hour, with a wind of 20 m.p.h. as with one of 5 m.p.h., and a windbreak can easily reduce wind velocities in this proportion. Used in this way they can often be made to form an effective background for the house and a protection for farm buildings. Another advantage of windbreaks is that they provide shelter and runways for insectivorous birds and small animals.

Belts of trees comprising one or two rows are usually called windbreaks, and with more than two rows, shelterbelts. In Southern Ontario windbreaks as a rule give sufficient protection except where wind erosion of soil on rolling land is severe, when shelterbelts may be required. On level land windbreaks may nearly always be established along existing fence lines, but on rolling land consideration should be given to the contour of the land. The prevailing winds in Southern Ontario are generally from the west, so that the greatest protection will be derived from windbreaks on the west side, but the placement of windbreaks on the other three sides as well should be considered.

Both the height of the trees and the wind velocity influence the effective range of a windbreak. An average windbreak will reduce the ground velocity of a 20-mile wind 10 per cent or more for a distance of about 30 times the height of the trees. About one-fourth of this effect will be felt on the windward side of the windbreak and three-fourths on the leeward side. For example, if the trees are 40 feet high the total effective range with a 20-mile wind will be 30 x 40 or 1,200 feet, 300 feet of which will be on the windward side and 900 feet on the leeward side. Generally speaking, the reduction in velocity is greatest close to the

windbreak and tapers out to zero further away. With higher wind velocities and/or higher trees the proportionate reduction and the effective range will be greater.

European alder is gaining great popularity as a windbreak tree because it is a nitrogen-fixer like the legumes and does not rob the soil to the same extent as non-nitrogen-fixing species. In fact, tobacco is frequently planted close to it with little loss in size or vigour of the plants. As the robbing of the soil is one of the severest criticisms levelled against windbreaks, consideration should also be given to the planting of such leguminous trees as honey locust and caragana on certain sites.

One consideration that should be kept in mind is that under certain circumstances windbreaks may cause air stagnation, which may increase temperature and moisture conditions to a dangerous degree in summer or increase frost damage in spring and fall on small areas, particularly in hollows. Where this is likely to occur, windbreaks should be planted so as to guide the flow of air past such spots. Where these conditions develop after the windbreaks are established they may be relieved by judicious opening up of the windbreaks.

Experience has shown that windbreaks are an asset to any farm, that their adverse effects, if any, are local and easily remedied, and that in many areas they are essential to the control of soil erosion by wind. It is therefore recommended that the Authority encourage the establishment of windbreaks by private owners in every way.

WATER

CHAPTER 1

INTRODUCTION

Ground-water studies of the Holland River Watershed were a part of the systematic survey carried out on the Upper Holland Valley.

The Geological Survey of Canada had sent ground-water parties to Whitchurch and King Townships in 1936 and 1937 and to Gwillimbury East Township in 1948. A report on King Township has been published in 1948[1] and on Whitchurch Township more recently while this report was in preparation in 1952[2].

In the survey covered by this section of the report an attempt was made not to duplicate work already done and before commencing the survey all files on previous studies were carefully examined.

The main purpose of this survey was:

(a) to find out whether the water table and the piezometric surface have been lowered since 1936.

(b) to study the Pleistocene stratigraphy in more detail than was done in 1936-37 and 1948, because detailed knowledge of the stratigraphy may help in the search for new ground-water supplies if those are necessary.

The terminology of Pleistocene deposits and ground-water is not discussed here, because Hainstock's, Owen's and Caley's reports on ground-water resources in King and Whitchurch Townships (1948 and 1952, Part I) deal with this.

A. K. Watt's recently published report (1952)[3] may be suggested as another reference for

explanations for ground-water terms and Chapman, L. J., and Putnam, D. F., 1951,[4] for Pleistocene terms with particular reference to Ontario.

CHAPTER 2

CLIMATE

The Holland River Watershed belongs to the cool temperate climatic region of Canada with long summers(5). The following average figures are taken from maps of the same book (pp. 221-223).

The average length of the frost-free period is approximately 130 days. The mean annual temperature is approximately 43° F., the mean temperature of the warmest month, July, being approximately 68°F., and of the coolest month, January, 17° to 18°F.

Precipitation in the Holland River Watershed is influenced by the dominant westerly winds and by the topography. The mean annual precipitation varies from 28 to 30 inches. The lowest precipitation is during the winter months, December to March (see Fig. 1), and the mean annual snowfall is 60 to 80 inches. The average number of rainy days is approximately 125, with a slightly higher number along the north side of the watershed. In comparison with other parts of Southern Ontario, the annual amount of precipitation is relatively low (the mean annual precipitation varies from 26 to 40 inches in Southern Ontario). It is, however, considered adequate and is fairly uniformly distributed throughout the year(5). Frequency of summer droughts (number of summer months, May to September having 1.0 inch or less of rain) has been below 20 over a 50-year period in the Holland River Watershed. This figure may be considered as an average for Southern Ontario, the extremes being below 10 and slightly above 30.

Maps of the mean annual water surplus and deficiency, based upon the C. W. Thornthwaite formula(5) show the following characteristics for our area. The mean annual water surplus, mainly during the wet months, is 10 inches, while the mean annual water deficiency of the dry months is approximately 2 inches. These two figures

FIG. 1

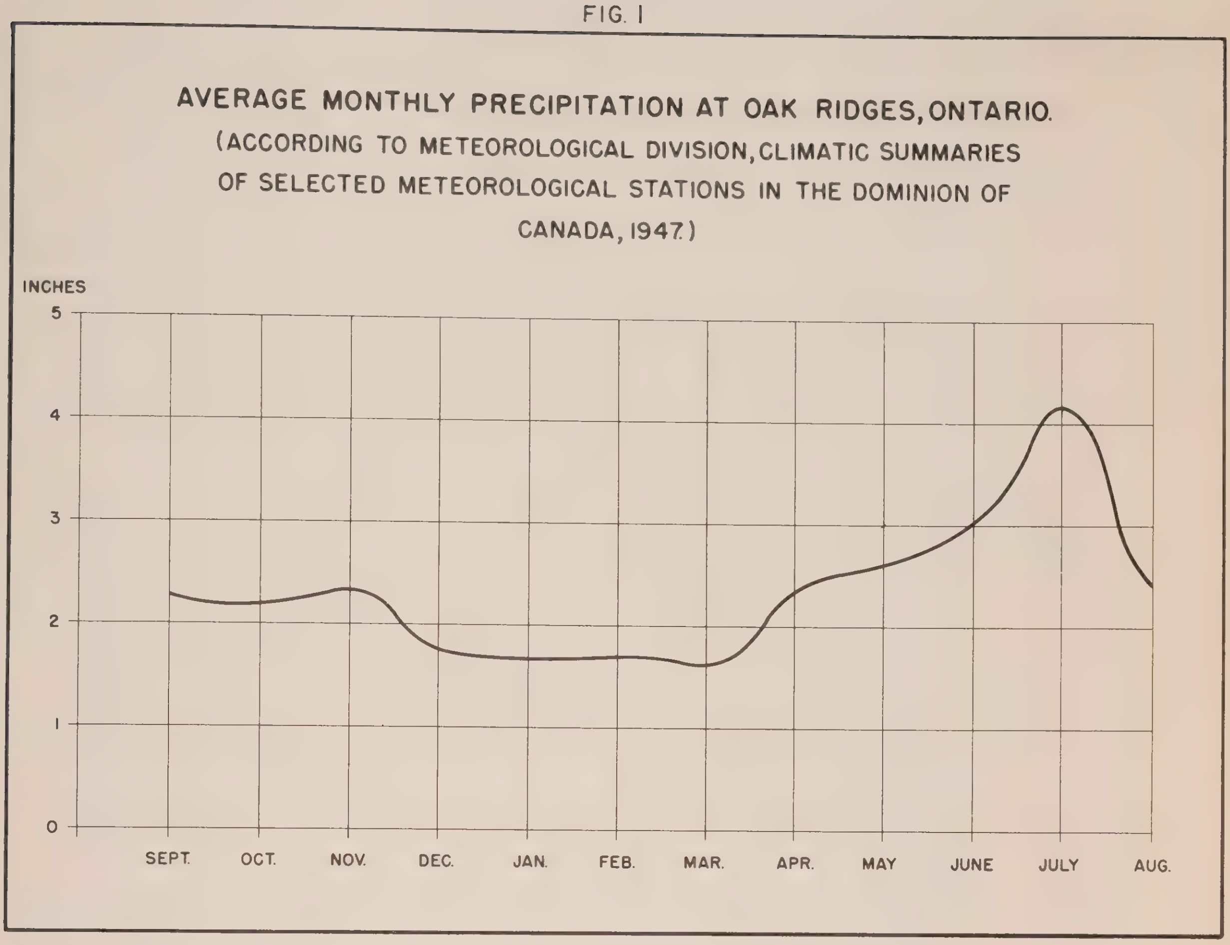
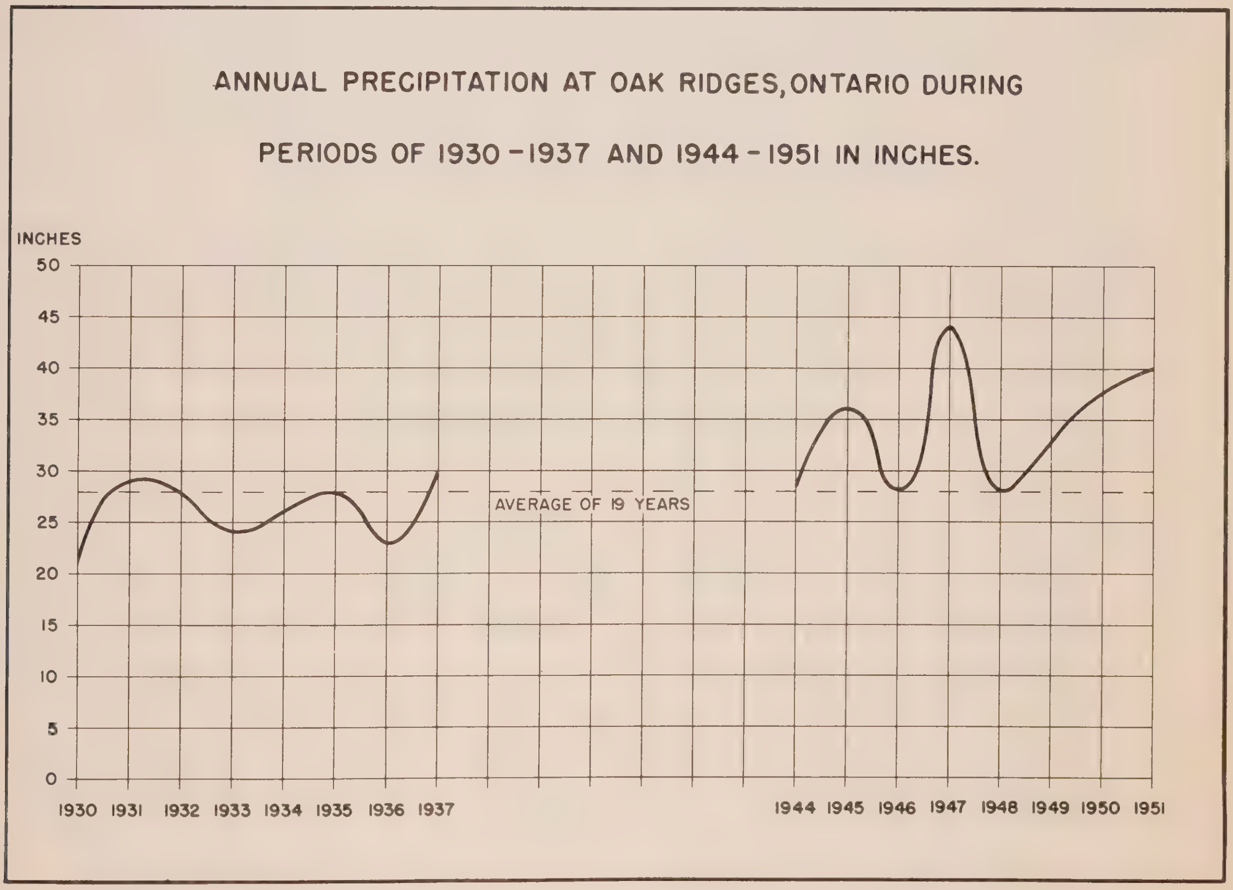

AVERAGE MONTHLY PRECIPITATION AT OAK RIDGES, ONTARIO.
(ACCORDING TO METEOROLOGICAL DIVISION, CLIMATIC SUMMARIES OF SELECTED METEOROLOGICAL STATIONS IN THE DOMINION OF CANADA, 1947.)
INCHES
5
4
3
2
1
0
SEPT.
OCT.
NOV.
DEC.
JAN.
FEB.
MAR.
APR.
MAY
JUNE
JULY
AUG.

FIG. 3


ANNUAL PRECIPITATION AT OAK RIDGES, ONTARIO DURING PERIODS OF 1930 - 1937 AND 1944 - 1951 IN INCHES.
INCHES
50
45
40
35
30
25
20
15
10
5
0
AVERAGE OF 19 YEARS
1930 1931 1932 1933 1934 1935 1936 1937
1944 1945 1946 1947 1948 1949 1950 1951

may explain the relatively high fluctuation of water table from a high in the late spring or early summer to a low in the fall or winter (see Chapter 9).

The monthly weather maps and monthly records, published by the Meteorological Service of Canada or the Meteorological Division of the Department of Transport, furnish some detailed information on weather changes. Unfortunately no meteorological station is located in the Holland River Watershed. The nearest station with a relatively long record is at Oak Ridges, just south of the watershed. Two more stations are near the north-west and the east ends of the watershed, Bradford in the north-west and Uxbridge in the east; but their records of precipitation extend no further back than 1948. If we compare measurements of precipitation at these three stations they differ in details, but the main trends of increase or decrease of precipitation are the same (see Fig. 2). Thus the measurements of precipitation at Oak Ridges will be used for further discussions of the principal changes of some meteorological factors during and before the years of ground-water survey in the Holland River Watershed.

Fig. 3 shows that before the survey of 1936 at least six years have been with a low precipitation, mostly below the average. 1937 shows a slight increase above the average, particularly during the months of January to May (see Fig. 4); the result was a general increase of water in wells (see Chapter 9).

In at least four years immediately preceding the survey of 1948, precipitation was above the average (see Fig. 3), and the same trend (above the average) continues up to the recent survey of 1952. Thus a relatively high water level may be expected for these last years in wells, if precipitation is the only factor determining the water table. There are, however, many other factors involved, for instance, evapo-transpiration, determined mostly by temperature and the cover of vegetation.

The scope of this report does not permit detailed discussion of these and other related factors.

Fig. 4 shows that the main part of the field seasons (May to September) of the ground-water surveys in the Holland River Watershed in 1936, 1948 and 1952 have been characterized by a relatively low precipitation, mostly below the average. The summer of 1937 was wetter, though with fluctuations above and below the average.

Temperature during the ground-water survey seasons in 1936, 1937, 1948 and 1952 was above average, particularly in 1952 (see Fig. 5). It may have caused a higher rate of evapo-transpiration which, together with a very low amount of precipitation in June 1952, resulted in a relatively rapid seasonal drop of water level in wells during the summer of 1952 (see Chapter 9). The very low precipitation of July 1936, accompanied by unusually high temperature in the same month, resulted in a heavy drop of water level in wells which had already been lowered by decrease of precipitation in the previous years.

The above brief discussion on some meteorological factors and their fluctuations from month to month and from year to year may help to account for some changes of water levels in wells. These meteorological fluctuations also make difficult a comparison of measurements of water table when measured at different months and years.

DEVIATION FROM THE MONTHLY AVERAGE PRECIPITATION
AT OAK RIDGES, ONTARIO

DURING THE YEARS 1935-1936, 1936-1937, 1947-1948 AND 1951-1952 IN INCHES.

FIG. 4

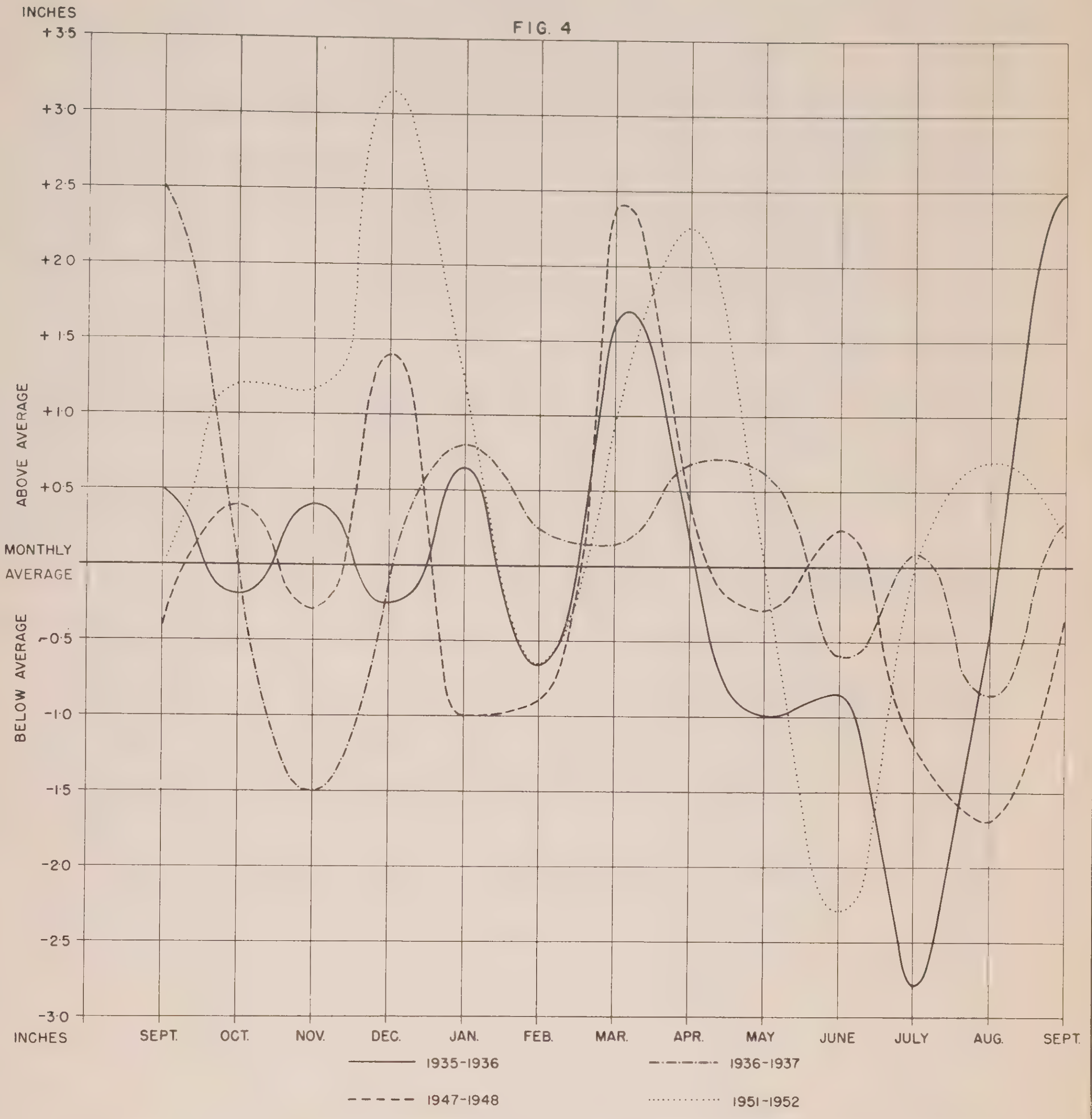
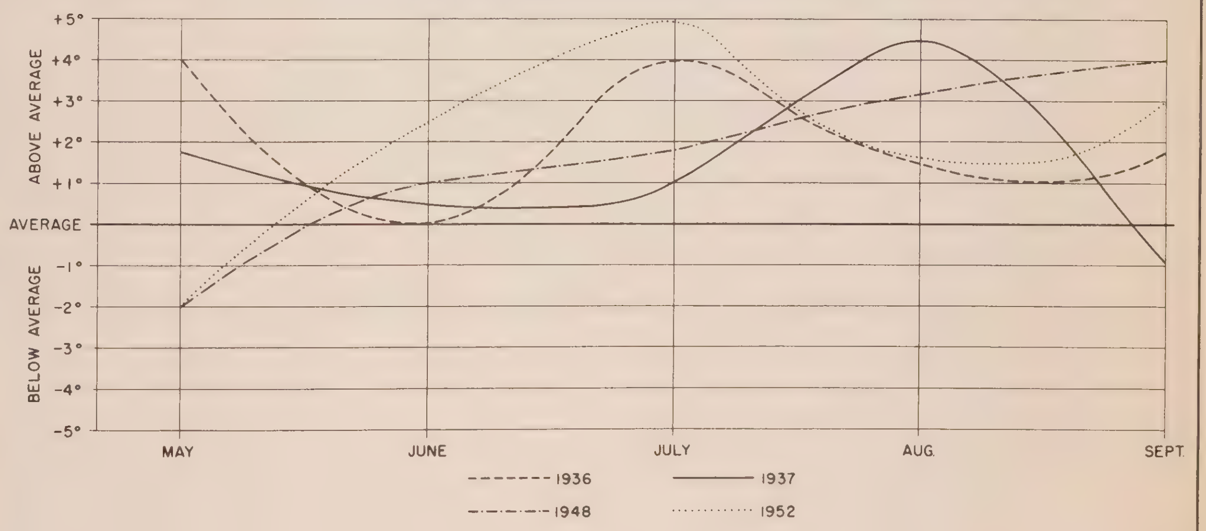


FIG. 5



DEVIATION FROM THE MEAN MONTHLY TEMPERATURE
AT OAK RIDGES, ONTARIO

DURING THE SUMMER MONTHS OF 1936, 1937, 1948 AND 1952.

CHAPTER 3

GEOMORPHOLOGY

The southern and south-eastern rim of the watershed consists of high morainic ridges: the interlobate Oak Ridges moraine in the south and a combination of smaller terminal moraines along the western side. The elevation of these hummocky ridges varies from about 1,000 feet to 1,250 feet above sea-level. The highest hills are in the east. The land slopes from this high rim towards the Holland River with a gradient of 100 to 200 feet per mile.

The area north-east from the Holland River is either a high plateau (a sand delta in the east) or a rolling ground moraine landscape, with some buried drumlins and hills, the remains of terminal moraines, projecting through later deposits of Lake Schomberg (see Chapter 4).

Irregular depressions without outlets occur in the extreme eastern part of the watershed, either dry or occupied by lakes or swamps, e.g., Musselman Lake, Island Lake.

The north-east divide of the watershed is marked by some buried drumlins or fragments of a terminal moraine. Its elevation is from 770 to 1,125 feet above sea level. Steepness of the gradient of the north-east slope towards the Holland River varies. It is relatively steep (up to 100 feet per one third of a mile) along a line which runs approximately south of Sharon along the Concession II/III road. Another relatively steep slope occurs east of the Canadian National Railway tracks, in the area between Wesley Corners and Ballantrae.

An abrupt drop in elevation is found along the ancient shoreline of Lake Algonquin, which is now occupied by the Holland Marsh. The drop is mostly from 825 - 975 feet elevation down to the flat lowland, 720 - 735 feet above sea level.

Most of the watershed, except the Lake Algonquin plain, is cut by numerous valleys, which make the relief very

uneven. "In the area along the Holland River between Newmarket and Holland Landing considerable dissection has taken place giving rise to rough topography", write L. J. Chapman and D. F. Putnam (1951, p. 217). R. E. Deane (1950, p. 87) concludes that "around Newmarket, in the Schomberg silts, erosion has produced a topography not unlike terminal moraine". This rough topography has been misleading to Hainstock, Owen and Caley (1948 and 1952, maps - Fig. 1), who have included most of the uneven area of the watershed either in "terminal moraine" or "kame moraine".

The following minor topographic features may be mentioned: kettles - small depressions or hollows without outlets along the interlobate Oak Ridges moraine and amphithreatre-like depressions along the Lake Algonquin shoreline, or at the heads of some short tributaries of the Holland River. At least some of the blunt, amphitheatre-like heads of valleys may have been cirques in the late-Wisconsin time, just after the ice sheet retreated from the area.

The hills at the headwaters are part of the Oak Ridges Moraine. They are made up of roughly stratified sand and gravel. Test pits for commercial extraction of gravel can be seen in the middle distance.

Stratified, water deposited sands, exposed in this road cut south of Vandorf, are covered by ice deposited boulder clay (or till) material.

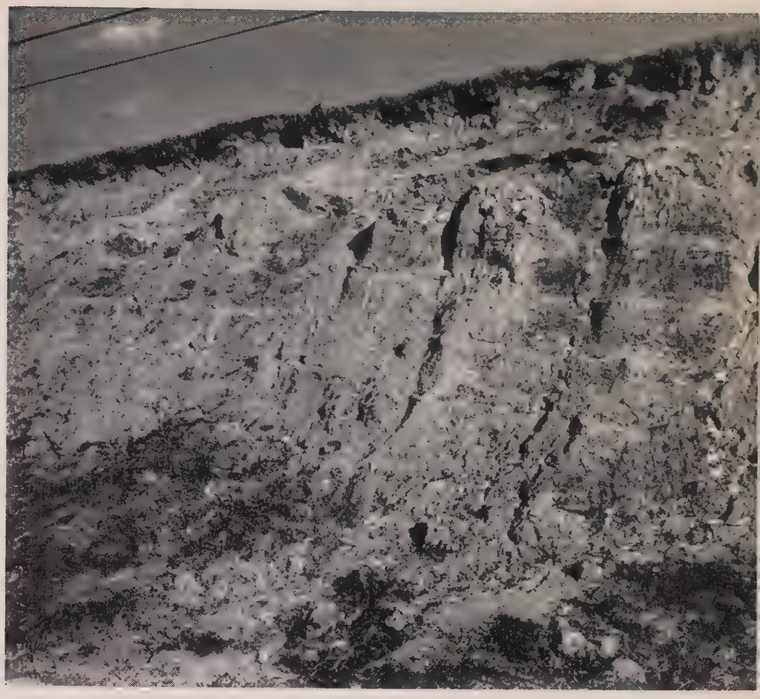
A broad view of the valley from the south-west shows the variety of land forms.

View of the Holland River Valley, looking west from Concession III, Lot 21, Whitchurch Township.

In the foreground the level land is the lake plain of late Schomberg ponding. The hills in the background are moraines.

The abandoned shore line of post-glacial Lake Schomberg is marked by the line between the level field in the foreground and the sandy hills in the background.

Silt and clay deposited in the Schomberg post-glacial lake are exposed here in a road cut near Bogarttown.



The hills in the moraine, called kames, are conical in shape and scattered irregularly.

Flanking the moraine are deltaic sand plains. These are crossed by little valleys cut by streams. Recent erosion, first by water and then by wind, has exposed the sandy material.

This level, silty land like the Holland Marsh itself is the bottom of post-glacial Lake Algonquin. The abandoned shore line is the edge of the hills in the background.

CHAPTER 4

GEOLOGY

1. Bedrock and its Surface

Bedrock does not outcrop in Whitchurch Township, but several wells and testholes, particularly at Newmarket, have reached it.

Hainstock, Owen and Caley (1952, Fig 1) show the boundary between two bedrock formations about three-quarters of a mile west of Vandorf. This boundary is drawn through the south half of Whitchurch Township, but is not continued north of Vandorf on the map. Both formations belong to the Ordovician system. The older one is the Billings formation (dark gray to nearly black, slightly bituminous shale), lying east of the line. The younger one is the Dundas formation (gray and blue shale, with thin sandy beds and lenticular limestone beds).

It is probable that the boundary between these two formations continues in a north-westerly direction between Aurora and Newmarket, because several testholes have encountered black shale (Billings formation) as bedrock at Newmarket.

Shale is mentioned as bedrock in the log of one of the testholes, drilled for the Town of Aurora (No. 1 in the files of Aurora, at the Ground-Water Division of the Ontario Department of Mines). It has been encountered at a relatively shallow depth (144 feet below surface) and lies approximately 260 feet above the black shale at Newmarket. Thus it should be younger than the black shale at Newmarket, and probably belongs to the Dundas formation.

No information on bedrock was available from the eastern half of the watershed.

R. E. Deane (1950, Fig. 8) has published a map of bedrock surface contours of the Lake Simcoe district,

including the western part of the watershed. This map shows a buried bedrock valley which runs from Cook Bay south along the western side of the Holland River Watershed. The bottom of the trough lies a little more than 300 feet above sea-level in the north-west corner of the watershed, and it slopes to below 300 feet towards the south. Though contours of the valley in Deane's map are based upon more than 10 wells, only three of them are in the Holland River Watershed.

Information on 14 more testholes and wells, which have reached bedrock, was gathered during the survey of 1952. Unfortunately most of them have been drilled in a small area, in Newmarket and its vicinity. They indicate a local depression in bedrock, probably a tributary of the main valley, at Newmarket and north of it (see Figs. 6 and 10), with its bottom 472 feet above sea-level at the Fairy Lake, Newmarket.

A surprisingly high bedrock surface is encountered at the Billings lot wells of Aurora (south end of the town): 730 feet above sea-level. 1.5 miles farther south the bedrock is again at a lower elevation (585 feet above sea-level at the Ontario Hospital). Gradual sloping of the artesian aquifer towards the north at Aurora (see Fig. 8) supports the assumption of a bedrock "hill" or ridge just south of Aurora. It may be a buried pre-Pleistocene monandnock or a pile of Ordovician shale, heaped up by ice-thrust in the interlobate area. (Similar ridges of bedrock have been observed in other interlobate areas.) It would be useful to investigate further the structure of this supposed ridge and its extent. If it consists of Ordovician shale, it may form a barrier between deep artesian aquifers on both sides.

2. <u>Pleistocene Deposits</u>

The bedrock is covered by a thick mantle of Pleistocene deposits in the Holland River Watershed. The minimal thickness is over the top of the bedrock hill south of

FIG. 6

UPPER HOLLAND RIVER WATERSHED

BEDROCK SURFACE AND AMOUNT OF CHLORIDE IN DEEP WELLS

Aurora (144 feet) and underneath the Lake Algonquin plain (Holland Marsh) - approximately 250 feet. Pleistocene deposits are thicker in the rest of the area, with the maximal thickness, probably over 500 feet, along the interlobate moraine and the western margin of the watershed, where a buried valley lies underneath (see p. 9).

All the wells of the area, with the exception of two, obtain their water from Pleistocene deposits. Even those which have reached the bedrock usually do not receive water from within that formation, because the top of the bedrock is usually impervious shale. Thus the principal aquifers of the Holland River Watershed are in the Pleistocene deposits.

Deep road cuts, creek banks and well-drilling logs show that the thick Pleistocene complex consists of several alternating till beds, lake (lacustrine) clays and silts, sands and gravels. The great thickness of Pleistocene deposits suggests that some of the deepest layers are older than the last, Wisconsin, ice age. The log of a testhole in Gwillimbury East Township mentions black muck and oily slime on the top of a large boulder at depths of 290 and 300 feet below surface. They may be either interglacial deposits or weathered Billings black shale.

Very often it is difficult to tell from well logs whether the driller has encountered sandy till or sand and gravel. Therefore those parts of stratigraphic sections (Figs. 8a; 8b), which cannot be checked by exposures of the corresponding beds should be considered as tentative interpretations of subjective reports of well-drillers or well-owners.

Unless samples of supposed interglacial deposits and of the deep till layers are available for detailed investigations, it is impossible to tell whether the thick Pleistocene deposits of the Holland River Watershed belong to one or more glacial ages. Chemical analyses of ground-water from

artesian aquifers do not provide sufficient means for stratigraphic classification of the thick Pleistocene complex. Therefore no stratigraphic sequence for the lower half of the Pleistocene deposits of the Holland River Watershed will be attempted in this report.

More successful has been the investigation of the upper part of the Pleistocene deposits, though the stratigraphic relationships there are also complicated.

The following outline of the geologic subdivisions of the Holland River Watershed is offered for the convenience of the reader:

(1) The interlobate Oak Ridges moraine (see the area "A" on the Pleistocene map, Fig. 7).

(2) The lower sandy till of the area north of the Oak Ridges moraine, approximately contemporary with the interlobate moraine, in most places covered by later deposits. The cover is thin over buried hills of the lower till (see the areas "B" on the Pleistocene map, Fig. 7).

(3) The main part of the Holland River Watershed is covered by deposits of the late-glacial Lake Schomberg time, including a - lacustrine deposits of the first early stage of Lake Schomberg, b - glacial and lacustrine deposits of a re-advance of the northern ice-sheet and c - lacustrine deposits of the late stage of Lake Schomberg. These deposits are principally sandy in the eastern half of the watershed and silty and clayey in the western half (see areas "C" and "D" on the Pleistocene map, Fig. 7).

(4) The Lake Algonquin plain (Holland Marsh) with lacustrine, mostly deltaic deposits, and contemporary bottomlands of the Holland River Valley and some other valleys (see the area "E" on the Pleistocene map, Fig. 7).

(A) The interlobate Oak Ridges Moraine

The interlobate moraine is a high ridge along the south side of the watershed with uneven topography. It had

FIG. 7

UPPER HOLLAND RIVER WATERSHED
PLEISTOCENE DEPOSITS

begun to form when most of Southern Ontario was still covered by the late Wisconsin ice-sheet.

The Oak Ridges moraine marks the divide between the Ontario lobe and another ice lobe north of it which covered also the Holland River Watershed. During one of the inter-stadial sub-ages of the Wisconsin glacial time (probably Tazewell-Cary or later) the split between the ice-lobes widened to a wide gap. Meltwater streams from both lobes flooded the gap and accumulated thick deposits of gravel and sand there. Gravel deposits, more than 100 feet thick, are exposed, for instance, in several gravel pits near the eastern end of the watershed, some of them outside it. A great part of the core of the Oak Ridges moraine consists of such gravel and sand deposits. They become finer-grained towards the west, downstream; for instance, coarse gravel predominates south of Musselman Lake, both sand and gravel south of Vandorf and fine sand north of Eversley.

When the ice lobes readvanced, probably during the early Cary sub-age of the last glaciation, they first blocked outlets of meltwater streams in the gap between them. A lake or isolated lakes developed there, depositing silt and clay on top of gravel. These lake deposits, usually thin, may be observed in many excavations, for instance south-east from Musselman Lake and in some places also between sand and gravel (in the moraine south of Vandorf). The top of these buried lacustrine clay and silt deposits is at an elevation of 1,000 to 1,200 feet, indicating that the water level of the lake or lakes was near or above the top of the present Oak Ridges moraine. The advancing ice lobes overrode the lake deposits, meeting again along the Oak Ridges moraine and depositing till on the top of them in varying thickness, usually more than 10 feet. Isolated ice blocks became buried in the till, particularly when one ice lobe overrode the edge of the other one.

When the glaciers retreated finally from the Oak Ridges moraine, the buried ice blocks thawed gradually and formed depressions without outlets. These depressions, called kettles, are very common features of the Oak Ridges moraine, particularly in the eastern part of the watershed. Some of the bigger depressions are along the north edge of the moraine and outside it, where stagnant ice has been buried by meltwater deposits, for instance, the depressions occupied by Musselman Lake and other lakes.

(B) <u>The Lower Till North of the Oak Ridges Moraine</u>

Many road cuts, particularly in valleys, and other exposures show a sandy till with streaks or lenses of sand and gravel underneath the relatively clayey deposits or sands of the Lake Schomberg time. This lower sandy till is even with the surface in many places, where the thin overlying deposits have been eroded.

Sandy lenses and layers permit ground water to circulate through the lower till, and therefore wells dug or drilled in the lower till have a fair-to-good water supply. Even the till itself is so sandy and gravelly that it has been used as gravel, for instance, from a small pit one mile east of Newmarket (sample H. 582, Table No. 1). Grain-size analyses (see Table No. 1 and Fig. 12) show that the lower till is of a sandy loam type and consists principally of sand (57 per cent - 78 per cent); silt makes up 16 per cent - 30 per cent, and clay merely 6 per cent - 13 per cent.

Some high exposures indicate that the lower till is at least several tens of feet thick. Lack of deeper exposures and of samples from drill-holes, however, makes it impossible to differentiate between the lower till and the older glacial deposits. Accordingly no lower boundary of the lower till has been determined in the Holland River Watershed.

The lower till was deposited by the northern ice lobe apparently at the time when both ice lobes met along the

GRAIN SIZE ANALYSES

Lab. No.		Location	Gravel 0.991 mm. %	Coarse Sand 0.991-0.589 mm. %	Medium Sand 0.589-0.246 mm. %	Fine Sand 0.246-0.102 mm. %	Very Fine Sand 0.102-0.05 mm. %	Silt 0.05-0.005 mm. %	Clay 0.005 mm. %
	(1) The Upper Till								
25	H.122	Gwillimbury E. Tp., Con. IE, Lot 105	.5	+	1.0	3.0	25.0	48.0	22.0
26	H.141	Whitchurch Tp., Con. I, Lot 35, 3 ft. below surface	3.5	1.5	6.0	6.5	30.5	30.0	22.0
27	H.141	Whitchurch Tp., Con. I, Lot 35, 9 ft. below surface	1.5	.5	3.0	8.5	22.5	35.0	29.0
28	H.185	Newmarket, N. end of Stanley St., 9 ft. below surface	+	+	.5	.5	24.5	40.0	34.0
32	H.539	Whitchurch Tp., Con. 8, Lot 24, 4 ft. below surface	+	+	.5	1.5	25.5	61.0	11.0
31	H.500	Whitchurch Tp., Con. 6, Lot 21, 6 ft. below surface	18.0	3.5	16.0	5.5	12.0	37.0	8.0
	(2) The Lower Till								
24	H.70	Gwillimbury E. Tp., Con. IE, Lot 12, 35 ft. below surface	2.0	1.0	4.5	8.5	41.0	31.0	12.0
22	H.59	Gwillimbury E. Tp., Con. 3, Lot 28, 20 ft. below surface	12.0	3.0	9.5	16.5	25.5	20.5	13.0
30	H.224a	King Tp., Con 2, Lot 27, 3 ft. below surface	5.5	2.0	9.0	25.5	31.5	20.5	6.0
29	H.212	Whitchurch Tp., Con. I, Lot 35, 10 ft. below surface	4.0	2.0	7.5	13.5	37.0	24.5	11.5
33	H.582	Whitchurch Tp., Con. 3, Lot 33, 10 ft. below surface	17.0	5.0	13.5	23.5	19.0	16.0	6.0

Oak Ridges moraine for the last time. It was laid down from the basal part of the ice as relatively flat ground-moraine or piled in ridges or hills of terminal moraines. Some drumlins were formed also. The buried till, consisting of the lower till (see area "B" on the Pleistocene map, Fig.7), may be either remnants of the north-north-west to south-south-east trending recessional moraines (a type of terminal moraines, formed by a retreating glacier) or drumlins.

Abundance of sandy and gravelly layers and lenses in the lower till may be explained by the activity of meltwater streams along the south side of the large northern ice-lobe. Even the till has become sandy and gravelly by including meltwater stream deposits.

C D <u>Deposits of the Glacial Lake Schomberg Time</u>

C <u>a</u> and D <u>a</u> <u>The early Lake Schomberg</u>

When the ice lobes finally retreated from the Oak Ridges moraine meltwater accumulated and formed a large lake or a system of lakes between the northern ice lobe and the Oak Ridges moraine. It is suggested here that this system of lakes be called the <u>early</u> Lake Schomberg, because it deposited the <u>earliest</u> lacustrine sediments of the Glacial Lake Schomberg (see Chapman and Putnam, 1936, p. 466, who named this lake, R. E. Deane, 1950, pp. 86 - 87, and Chapman and Putnam, 1951, pp. 216 and 217, for description of deposits of this lake stage).

Varved silt, clay and fine sand dominate among the deposits of the early Lake Schomberg. Clay and silty clay are found particularly in the central part of the Holland River Watershed, around Aurora and Newmarket (see the area "D" on the Pleistocene map, Fig. 7). Thus, varved clay may be seen in several road cuts of this area, for instance, east of Aurora or south of Holland Landing. The varved deposits become more silty or even sandy towards the periphery. Thick sand on silt is seen below a thin cover of till approximately two miles south-west of Aurora (samples H.617 and H.234, Table No. 2), in road

TABLE NO. 2

GRAIN SIZE ANALYSES

Lab. No.		Location	Gravel 0.991 mm. %	Coarse Sand 0.991-0.589 mm. %	Medium Sand 0.589-0.246 mm. %	Fine Sand 0.246-0.102 mm. %	Very Fine Sand 0.102-0.05 mm. %	Silt 0.05-0.005 mm. %	Clay 0.005 mm. %
	(3) The Lower Sand and Silt								
34	H.617	King Tp., Con. I, Lot 13, 4 ft. below surface	-	-	+	13.5	64.0	20.0	2.0
9	H.275	King Tp., Con. I, Lot 13, 4-15 ft. below surface	+	+	.5	26.5	56.0	16.5	+
8	H.234	King Tp., Con. 3, Lot 20	-	-	.5	29.5	55.5	14.0	+
10	H.327	Whitchurch Tp., Con. 3, Lot 14, 10 ft. below the top of sand	-	-	+	23.0	60.5	15.5	+
20	H.586	Whitchurch Tp., Con. 3, Lot 14, top of sand	-	-	+	2.0	43.5	50.0	4.0
19	H.586	Whitchurch Tp., Con. 3, Lot 14, 38 ft. below top of sand	+	+	.5	39.5	42.0	16.0	1.5
18	H.585	Whitchurch Tp., Con 3, Lot 17, 7 ft. below surface	+	+	.5	1.0	24.0	71.0	3.0
6	H.179	Whitchurch Tp., Con 3, Lot 31, 5-10 ft. below top	-	-	.5	.5	37.0	58.0	4.0
13	H.412	Whitchurch Tp., Con. 4, Lot 18, 9 ft. below top	-	-	+	27.5	59.0	13.0	+
12	H.404	Whitchurch Tp., Con. 5, Lot 24, 20 ft. below top	-	-	+	60.5	34.0	5.0	+
14	H.500	Whitchurch Tp., Con 6, Lot 21, 30 ft. below top	-	-	.5	70.5	27.0	1.5	+
16	H.501	Whitchurch Tp., Con. 6, Lot 20, 8 ft. below top	+	3.5	72.0	23.5	.5	+	+
1	H.6	Whitchurch Tp., Con. 9, Lot 21, 4 ft. below till	-	-	+	49.0	42.5	7.5	.5
3	H.6	Whitchurch Tp., Con. 9, Lot 21, 6 ft. below till	1	4.5	36.5	51.5	5.5	.5	+

cuts at Vandorf (sample H.585, Table No. 2), at Bogarttown (sample H.179, Table No. 2), and in other places. Lacustrine silt and fine sand grade into deltaic sand in the area east of the Canadian National Railway, east of Wesley Corners (see samples H.6, H.404, H.412, H.500, H.501, in Table No. 2). This is the lower sand of the eastern half of the watershed, more than 100 feet thick around Ballantrae and covered by the very similar upper sand with a thin layer of gravelly sand or till between them. Increase in grain-size of sand towards the north-east indicates that the meltwater streams came principally from the retreating northern ice lobe. (Composition of the north-eastern samples is represented by the right side of the diagram Fig. 13, and of the south-western sand samples by the left side). Both the early Schomberg sand and silt deposits are well sorted. The coefficient of sorting is approximately 1.4, which means a good sorting. This coefficient is: $\sqrt{Q_1/Q_3}$, where Q_1, and Q_3 are the first and third quartiles, determined as the diameter values in millimeters, corresponding to the points of intersection of the curve in Fig. 13 with the 25 per cent and 75 per cent lines, respectively (see R. E. Deane, 1951, p. 16).

Some well logs, for instance those just south of Aurora, report fine sand just below the lacustrine clay (see Fig. 8). This fine sand may have been deposited at the very beginning of the early Lake Schomberg stage, when the ice margin was closer to Aurora.

$C^{\underline{b}}$ and $D^{\underline{b}}$ The Upper Till

The early stage of the Glacial Lake Schomberg was brought to a close by a readvance of the northern glacial lobe. It advanced first along the Lake Simcoe depression, invaded the depression of the Holland Marsh and then formed local lobes, spreading southwards. While the ice was still in the Holland Marsh, gravel was deposited in form of kame terraces between the glacial ice and the high wall of the

Holland Marsh depression. Later these kame terraces were overridden by the glacier and covered by till. Such gravel deposits may be seen 1¼ miles north and north-west of Queensville. One of the advancing local lobes covered most of the Holland River Watershed, even overriding the northern edge of the interlobate moraine in some places (see the southern margin of the area "D" on the Pleistocene map, Fig. 7).

The advancing ice-sheet was thin and it did not cover some of the higher hills of the lower till, but flowed around them, for instance in Whitchurch Township, Con III, Lots 17 to 24. Local ponds of meltwater developed in these gaps with deposits of sand along the tops and slopes of these hills.

The advancing ice picked up the lacustrine silts and clays, which had been deposited during the early Lake Schomberg time, and involved them in its basal part. Therefore the resulting upper till is rich in silt and clay and reflects the local type of lacustrine deposits. In some places it even looks like lacustrine material, the only difference being in its lack of stratification, its till-like texture (jointing and crumbling) and its occasional pebbles or boulders with striated surfaces.

The grain-size analyses (see Table No. 1 and Fig. 12) classify this till as a clay loam: the dominant grain-size is silt (30 - 48 per cent), clay constitutes 22 - 34 per cent and very fine sand predominates in the sand fraction (in samples H.122, H.141 and H.185).

This till layer may be found in the entire "D" area (see the Pleistocene map, Fig. 7), but mostly on hills. It is thin in most places and has been eroded in valleys, where the underlying $D^{\underline{a}}$ lacustrine deposits predominate in exposures, for instance, in the road cuts at Bogarttown, at Holland Landing (see Chapman and Putnam, 1951, p.217), and in other places. These and similar other exposures may have been misleading to Chapman and Putnam (1951, map of the central section), when they named the area around Newmarket a <u>clay plain</u>, and described it

as consisting of "deep deposits of stratified clay and silt" (p.216), without mentioning the upper till on the top.

The upper till becomes thicker in some places, particularly along the slope of the Holland River depression just south of Holland Landing, where the maximal thickness may be over 100 feet (see the profile section, Fig. 8a).

The same ice lobe, which deposited the upper till in the area "D", overrode the sandy deltaic deposits in the eastern half of the watershed. A thin veneer of till or a gravelly, washed-out remnant of it (approximately one foot thick) may be seen in several exposures of the area "C" (see Fig. 8b). In most places it is covered by another sand layer but is without this sandy cover and also thicker along the north-eastern high edge of the area. This till is more sandy or silty (see samples H.500 and H.529 in the Table No. 1 and Fig. 12), and is similar to the lower till. As already mentioned the thin till layer is washed out through most of the area "C", turned into a gravelly sand, and thus permits a free movement of water from the upper sand down to the lower sand.

Another lobe, coming from the south-west end of the Holland Marsh, invaded the western and south-western edge of the Holland River Watershed, as is indicated by the long axes of pebbles in the upper till, in the area as far as two miles west from Aurora. This lobe deposited a very thin layer of silty and fine sandy till, with fine sand underneath it.

Sand from underneath this till extends also in an easterly direction, south of Aurora. It is either without any cover of till or is covered by a thin veneer of till or scattered boulders deposited by the main lobe of the watershed (see the area "C" south of Aurora on the Pleistocene map, Fig.7, or in the profile section, Fig. 8a). The sand is mostly fine-grained (sample H.275, Table No. 2), with a nearly horizontal bedding and over 100 feet thick. It was deposited in a local lake between the two northern ice lobes and the Oak Ridges

moraine. This small lake filled fast with sand and silt, interbedded with some gravel. The gravel may be seen, for instance, in the small pits at the Aurora Hunt Club. The lake drained south across the Oak Ridges moraine via several spillways. One of them crosses the Oak Ridges moraine three miles south-east of Aurora, leading towards George and Wilcox Lakes.

C^{c} and D^{c} The Late Lake Schomberg

When both above-mentioned northern ice lobes retreated, the late Lake Schomberg expanded and its level was lowered, until new outlets in the west failed to drain it.

The highest, though weak, shorelines of this gradually lowering late Lake Schomberg may be seen north of Ballantrae, at an elevation higher than 1,000 feet above sea-level. The thin upper till below this shoreline is glacially reworked lacustrine silt. Therefore it may be concluded that a high level lake existed in this area also just before and during the ice advance (during the C^{b} time).

Better-developed shorelines may be seen at an elevation of approximately 1,000 feet above the sea-level along slopes of the hills between Newmarket and Vandorf, also two miles south-west of Newmarket and 1 to 1.5 miles north-west of Aurora, with a gravel bar behind the Aurora Orchards and St. Andrew's College.

The later and lower shoreline appears to be approximately 900 to 925 feet above sea-level along both sides of the Holland River valley between Holland Landing and Aurora. It is inconspicuous there, but is better developed farther north, for instance along the south end of a drumlin ¼ mile east of Queensville, with gravel deposits, or at the cemetery north of Queensville.

The still lower shorelines, below 850 feet, probably belong to the Lake Algonquin and will be discussed later.

During the late Lake Schomberg time the upper sand was deposited by meltwater streams, discharging into the lake, through the eastern part of the watershed, (area "C")and in those places of the central part, where a sand cover "D_2" is marked on the Pleistocene map, Fig. 7. Some "arms" of sand (not marked on the map) extend even farther west across the clayey area, indicating lowering of water level in the lake and development of drainage channels towards the deepest part of the Holland River Valley. The main drainage channels, carrying water from the east, were along the upper part of the Holland River and along its two principal tributaries between Wesley Corners and Bogarttown. Remnants of stagnant ice in the central Holland River depression, being higher than the lake level, prevented deposition of the upper sand in those places which were covered by the ice. As meltwater streams flowed along crevasses in the stagnant ice, they deposited sand in the form of small kame hills, for instance in Whitchurch Township on both sides of the Con. II/III road, Lot 19 and Con. II, Lot 16, western end.

Silt and clay, up to two feet thick, were deposited, particularly in the central depression, along the north-south axis of the Holland River, between Aurora and Sharon. A very typical exposure was in an excavation at Aurora Orchards, 0.5 miles north-west of Aurora, at an elevation of approximately 850 feet above sea-level.

1-3 feet - varved clay and silt, with more than 50 thin varves (thus deposits during a period longer than 50 years) and a layer of silt (0.5 to 1 foot) underneath the varved part; deposits of the late Lake Schomberg.

1.5 feet - very clayey till with a few pebbles and a very sharp upper boundary.

More than 4 feet - silty lacustrine clay without definite varving, contorted, apparently by ice pressure; deposits of the early Lake Schomberg.

As the silty or clayey cover of the late Lake Schomberg is thin in the Holland River Watershed, it is preserved mostly on the high land, together with the equally thin upper till, but is eroded in the drainage depressions and along their slopes.

Lacustrine silt was found at an elevation of 900 feet above sea-level even as far north as .5 miles south-south-west of Holland Landing, indicating a high lake level still existing at a time when most of the area was free of ice, and the glacier was retreating in the Holland Marsh depression.

The analysed samples of the upper sand are, for the most part, well sorted (see Table No. 3 and Fig. 13); only one silt sample from the northern part of the watershed (H.68, see Table No. 3) shows a poorer sorting.

The ice did not retreat steadily from the Holland River Watershed during the late Lake Schomberg time, but readvanced for short distances several times. These readvances, principally from the depression of the Holland Marsh, are marked by changes of the ice-flow direction in the uppermost part of the upper till. Thus the oldest direction is from north or north-east around Newmarket and Holland Landing, but the latest ice advance is from the north-west (see the "O" and "Y" directions on the Pleistocene map, Fig. 7).

E <u>Lake Algonquin Deposits and Cirque-like Formations</u>

When the glacier had retreated from the Holland Marsh and later from the Lake Simcoe basin, the lowland became a part of Lake Algonquin. A relatively high shore line of the

TABLE NO. 3

GRAIN SIZE ANALYSES

Lab. No.	Location	Gravel 0.991 mm. %	Coarse Sand 0.991-0.589 mm. %	Medium Sand 0.589-0.246 mm. %	Fine Sand 0.246-0.102 mm. %	Very Fine Sand 0.102-0.05 mm. %	Silt 0.05-0.005 mm. %	Clay 0.005 mm. %
	(4) The Upper Sand and Silt							
7	H.199 King Tp., Con. 2, Lot 20, 4 ft. below surface	-	+	1.5	26.5	53.0	17.5	1.0
11	H.362 Whitchurch Tp., Con. 2, Lot 19, 27 ft. below surface in a kame hill	-	-	2.0	69.0	27.0	1.5	+
35	H.534a Whitchurch Tp., Con. 3, Lot 23, 4 ft. below surface	-	+	6.5	32.0	52.0	9.0	-
15	H.501 Whitchurch Tp., Con. 6, Lot 20, 5 ft. below surface	.5	7.0	73.0	18.0	1.0	+	+
36	H.669 Whitchurch Tp., Con. 8, Lot 19	8.5	7.5	35.5	26.5	14.5	7.5	-
2	H.5 Whitchurch Tp., Con. 9, Lot 21, 5 ft. below surface	-	+	38.5	55.0	5.5	+	+
37	H.670 Whitchurch Tp., Con. 9, Lot 17	5.0	12.0	41.0	28.5	13.0	+	-
4	H.6 Whitchurch Tp., Con. 9, Lot 18	+	3.5	44.0	40.0	10.0	1.0	1.0
23	H.68 Gwillimbury E. Tp., Con. 2, Lot 13, 2-3 ft. below surface	-	+	+	1.0	14.5	50.0	34.0
5	H.42a Gwillimbury E. Tp., Con. IE, Lot 113, 5 ft. below surface; deltaic sand of the Lake Algonquin	-	+	14.5	79.5	5.0	+	+

beginning of this lake stage in our area may be seen along the highland slope south-east of Holland Marsh, at an elevation of 810 to 850 feet above sea-level, extending also in the valley system of the Holland River and its tributaries up to Aurora, as a wide erosional terrace. Silt deposits of this lake stage cover the north-eastern part of the watershed, between the 850-foot level and the main Algonquin shoreline.

Elevation of the main Lake Algonquin water level is lower, approximately 740 to 760 feet above sea-level (see R. E. Deane, 195, Fig.6). The corresponding shoreline, with many wave-washed boulders, or sand and gravel, is along the foot of the steep highland-slope which borders the Holland Marsh (see Figs. 7 and 8a). A corresponding sandy middle terrace extends along the Holland River Valley past Newmarket.

A wide sandy delta was deposited in the Holland Marsh by the influent Holland River in Lake Algonquin, but silt and clay was laid down in the northern part of the watershed (see the Pleistocene map, Fig. 7, and Fig. 8a).

Some of the short valleys which lead down to the Holland Marsh or to the Holland River have a peculiar form: a wide and blunt amphitheatre-like head, often even with a narrowing of the valley farther below. Some of the blunt-headed valleys may have been formed by the melting of buried ice-blocks, particularly those along the interlobate area, where kettles are not an uncommon feature. No typical kettles have been observed in the Newmarket-Holland Landing-Queensville area. It is possible that the short blunt-headed valleys, at least some of them, were cirques, even with small cirque glaciers. R. E. Deane (1951, p.84) mentions a large amphitheatre, "The Hollows", four miles east of Cookstown, with a morainic ridge between it and the main valley. This may be of

a similar origin, formed by a cirque glacier. Some smaller amphitheatres may have been formed by springs during the existence of a higher ground-water table, but this mode of formation could not explain the large amphitheatres.

A brief summary of the Pleistocene stratigraphy of the Holland River Watershed follows on Table No. 4.

TABLE NO. 4

(PART A)

PLEISTOCENE HISTORY OF LATE WISCONSIN TIME, HOLLAND RIVER WATERSHED

<table>
<tr><th>AREA / TIME</th><th>WESTERN AND NORTHERN PART
(Principally Silty and Clayey Lake Schomberg and Lake Algonquin Area)</th><th>EASTERN PART
(Deltaic Sand Plain)</th><th>SOUTHERN BORDER-ZONE
(Oak Ridges Moraine)</th></tr>
<tr><td>Recent</td><td colspan="3">Erosion: Increased stream-erosion has formed the rough topography, particularly in the silty and clayey Lake Schomberg area, western half of the deltaic sand plains and northern edge of the Oak Ridges Moraine

Deposits: Peat and muck in depressions and in the lower part of the Holland Marsh; bottomland in valleys; some low sand dunes and drift-sand, particularly in the eastern deltaic sands.</td></tr>
<tr><td>Lake Algon-quin</td><td>Erosion: Strong shore-line along the south-eastern side of the Holland Marsh and wide valleys of Holland River and its tributaries

Deposits: Mostly deltaic sand (good aquifer) in the Holland Marsh and in the Holland River Valley between Holland Landing and Bogarttown; clay along the eastern side of the Holland Marsh</td><td>Erosion of tributaries of Holland River and its upper part</td><td>Erosion of gullies down to Holland River</td></tr>
</table>

TABLE NO. 4 (PART B)

<table>
<tr><th></th><th colspan="3">WESTERN AND NORTHERN PART</th><th>EASTERN PART</th><th colspan="2">SOUTHERN BORDER-ZONE</th></tr>
<tr><td rowspan="6">Glacial Lake Schomberg</td><td colspan="4"><u>Late Lake Schomberg</u></td><td colspan="2" rowspan="2">Gravelly terraces in some spillways, which drained the Lake Schomberg waters across the Oak Ridges</td></tr>
<tr><td colspan="3">Deposits: Thin layer of silt and clay, eroded later in valleys; sand instead of silt and clay along some drainage depressions, along the eastern edge of the watershed, west of Newmarket, and in some small kames south-east of Aurora</td><td>Deposits: Deltaic sand ("upper sand"), deposited by streams coming from north east; a good aquifer; finer in the west | coarser in the north-east</td></tr>
<tr><td rowspan="2">S.W. side: silty till, thin, deposited by a lobe advancing from the W. up to 2 miles W. and N.W. from Aurora</td><td rowspan="2">South side (south of Aurora): Sand and gravel, deposited between the Oak Ridges moraine and the advancing northern ice lobe; good aquifer</td><td colspan="2"><u>Advance of a northern ice lobe, covering most of the area</u></td><td rowspan="2">The advancing northern ice lobe overrides the N. edge of Oak Ridges moraine in some places, adding small ridges of terminal moraines S.E. from Aurora</td><td rowspan="4">moraine, particularly during the advance of the northern ice, when lower outlets became closed</td></tr>
<tr><td>Deposits: A thin layer of clayey till in the area of the clayey deposits of the early Lake Schomberg, silty till in the remaining area. Thick accumulation of till (up to 60 feet) just S. of Holland Landing. Poor aquifer.</td><td>Deposits: Very thin layer of silty or sandy till, reduced to a gravelly lamina in most places; becomes thicker towards north</td></tr>
<tr><td colspan="4"><u>Early Lake Schomberg</u></td><td rowspan="2"></td></tr>
<tr><td colspan="3">Deposits: Up to 120 feet of lacustrine silt, fine sand and clay (clay in the central part of the depression, the Aurora-Newmarket area, silt around it); poor aquifer

Sand in some places below the silt and clay, fair to good artesian aquifer</td><td>Deposits: Thick deltaic sands ("lower sand", over 100 feet), deposited by streams, coming from north-east; good aquifer
finer in the west | coarser in the north-east</td></tr>
</table>

TABLE NO. 4

(PART C)

<table>
<tr><th></th><th>WESTERN AND NORTHERN PART</th><th>EASTERN PART</th><th colspan="2">SOUTHERN BORDER-ZONE</th></tr>
<tr><td rowspan="4">Before Lake Schomberg time</td><td colspan="2" rowspan="4"><u>The area covered by an oscillating northern ice-lobe</u>
Deposits: The lower sandy till with intercalated beds and lenses of sand and gravel; the principal artesian aquifer; ridges and hills of terminal moraines and drumlins buried underneath later deposits. Age and stratigraphy of deeper Pleistocene deposits unknown</td><td colspan="2">Till or boulder-clay, deposited by both the Ontario and the northern ice-lobes; up to 140 feet thick</td></tr>
<tr><td colspan="2">Stratified gravel and sand, meltwater deposits:</td></tr>
<tr><td>Sand dominates in the west</td><td>Gravel dominates in the east, over 100 feet thick</td></tr>
<tr><td colspan="2">Till or boulder clay</td></tr>
</table>

CHAPTER 5

PRINCIPAL AQUIFERS

The best aquifers or water-bearing beds are equally grained or well-sorted sediments with wide pore spaces, for instance, evenly grained gravel or coarse sand. The wide sandy area "C" in the eastern half of the Holland River Watershed may be considered as such a good aquifer. The upper and lower sand is at least 100 feet thick throughout most of this eastern area, is well sorted and has a large storage space for ground water. Thus water levels in wells of this area have not fluctuated very much even during the dry years or seasons, when the fluctuation was strong in the rest of the watershed (see Chapter 9).

Another, though smaller, area with thick sand deposits up to 130 feet is south of Aurora. It is connected underground with sand underneath the upper till west, north and east of it. The fact, however, that most of this sand is finer and even silty in places (see Table No. 2: H. 617, H. 275, H. 234), decreases its yield. Thus the quality of this aquifer is not as good as of that in the eastern part of the Holland River Watershed.

A third sandy area is in the Holland Marsh, and extending as a sandy terrace along the Holland River past Newmarket. The sand of the Holland Marsh is fine or medium-grained and well sorted (see Table No. 3 sample H. 42a), thus forming a fairly good aquifer. Sand in the bottomland of the lower part of the Holland River is of a similar quality, particularly below Newmarket.

Thick sand and gravel lenses or beds occur also in the core of the Oak Ridges moraine and in the lower till which underlies the watershed north of the interlobate moraine. Extent and trends of the sand layers and lenses could not be traced through the entire area in the lower till, but some aquifers could be detected in smaller areas. One of the artesian

aquifers is believed to be just below the clayey complex of the Lake Schomberg time (see, for instance, the profile section at Sharon, Fig. 9). Richer aquifers, feeding several flowing wells, occur at a depth of 80 to 140 feet in the Holland River depression around Newmarket, Sharon, Holland Landing and Aurora (see Figs. 8a, 8b). These aquifers appear to be interconnected between the Newmarket and Sharon areas. Artesian aquifers have been encountered by several deep wells at other depths, for instance approximately 200 feet deep at Holland Landing. One of them lies just above the bedrock through most of the western part of the Holland River Watershed (see profile section, Fig. 8a)

It seems that the artesian aquifers are connected with the above-mentioned sandy areas in the east and the south of the watershed. As the sand of these areas is exposed at the surface and may absorb most of the precipitation, they should be considered as the principal intakes or source areas for the artesian waters around Aurora, Newmarket, Holland Landing and Sharon. The artesian wells at Aurora are supplied principally from the sandy intake south of it. Even if a bedrock barrier exists between the intake area and Aurora (see Fig. 8a), water, being under pressure, moves across it or flows around it.

Chemical analyses of artesian waters (see Chapters 6 and 7) and observations on lowering of artesian pressure by the Newmarket town wells (see Fig. 15) indicate that underground flow of the artesian water at Newmarket is principally from south-east towards north-west. <u>Therefore the wide sandy area of the eastern part of the Holland River Watershed may be considered as the principal intake area for Newmarket</u>. The Holland River valley south of Newmarket is of secondary importance as a source of water, but of greater importance as a probable source of contamination (see Chapter 7). It seems probable that the artesian wells of the Holland Landing and Sharon areas are supplied also by a ground-water flow from south-east towards north-west.

The hills of the lower till partly buried underneath later deposits are not as rich in water as the deeper parts of the lower till. Some of them, for instance between Newmarket and Wesley Corners, are sufficiently high, so that their surface may be considered as local intake areas. As these intakes are small, the shallow wells on these hills soon become dry in dry seasons.

In the Oak Ridges moraine a similar situation prevails. Being of a larger extent and having a thick gravelly and sandy core, the moraine has a fairly good water storage space. It accordingly not only supplies its own deep wells, but even discharges some groundwater via springs in the Holland River valley. The water is, however, relatively deep (mostly deeper than 100 feet), and many of the shallow wells, which take water from the till cover, become dry in the fall or winter.

The silty and clayey complex of the Lake Schomberg time and the intercalated glacial deposits are poor aquifers. Therefore wells, which have not been dug or drilled through it, show a rapid decrease of water during dry seasons or dry years, (see Figs. 8a and 9). Clay prevents circulation of water, and if wells terminating in it become contaminated, they remain so for a very long time. Thus the shallow wells of the silt and clay area have a higher amount of chloride and nitrates, which derive from sewage, barnyards, etc., than similar shallow wells in the eastern sandy area (see Chapter 7).

Another clay area is in the eastern part of the Holland Marsh. Shallow wells, dug in this clay, very often go dry towards the end of a dry summer.

Hainstock, Owen and Caley[1,2] do not advise drilling into bedrock for water, because "water derived from this source will in all probability be too salty for domestic use". One 960-feet deep flowing well in Gwillimbury E. Tp. is drilled into rock and receives at least a part of

the artesian water from it. The amount of chlorides is relatively low in this well (38 p.p.m.). A comparatively higher amount of chlorides (164 p.p.m,) is found in another deep well in Gwillimbury East Township, but the owner was not sure whether this well was the one which had been drilled into rock. Even this water is not salty. Apart from the question of salinity, it is not advisable to drill deep wells into bedrock in the Holland River area because of its great depth and the shaly character of the rock.

CHAPTER 6

WATER SUPPLY OF THE HOLLAND RIVER WATERSHED

1. The Rural Area, Summer Cottages, Villages

The rural area, summer cottages, villages and a suburban area about Newmarket are supplied by individual wells or springs.

Of the 1,116 wells and springs which were surveyed in 1936, 1937 and 1938, 63 per cent are dug wells, 32 per cent drilled and bored, 5 per cent springs, 0.1 per cent driven wells. Some of the dug wells are as old as from 1830. Drilling of wells started at the end of the 19th century. Most of the drilled wells are along Highway No. 11 and around Newmarket and Musselman Lake.

Springs are located mostly along slopes of the Holland River depression, the northern slope of the Oak Ridges moraine and the Lake Algonquin shoreline (see the maps, Fig. 2, of Hainstock, Owen and Caley, 1948 and 1952, for location of springs and wells except in Gwillimbury East Township).

In that part of the Holland River Watershed which belongs to King and Whitchurch Townships, drilling of wells has increased during recent years. Of 369 wells which have been added to the previously surveyed 1,116 wells, 64 per cent are drilled wells, 31 per cent dug wells, 1 per cent springs, and 4 per cent driven wells (sand-points).*

Many of the old dug wells have been abandoned and either filled or kept as a reserve for use in emergency. Most farms have at least two wells; one of them at the barn and another at the house. Some of them have ponds or field wells or cribbed springs for stock in pasture.

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* At least half of the dug wells recorded in 1952 were old wells from the north side of Newmarket. As approximately the same number of new wells are not recorded from the summer cottages north of Holland Landing, the percentage of dug wells should be nearly correct. The percentage of driven wells should be slightly higher, as a number of shallow wells, being all of the same depth, were not recorded in the above area of summer cottages.

2. Town of Aurora

Most of the town and part of the surrounding rural area is supplied by municipal wells.

The waterworks of Aurora have been in operation for more than 36 years: an old plan of the town of Aurora of 1916 already shows a reservoir and a water tower at the Andrew's pond. A by-law of the same year also mentions the waterworks.

The first wells were apparently at the waterworks, where two wells are in operation at the present time: the Waterworks well and the Gurnett Street well, both approximately 260 feet deep and both flowing.

An extensive drilling program was carried out in 1934 and 1935, when at least 12 testholes were drilled by E. F. Roberts. Most of them were developed into wells: at least three wells on the Billings lot and six wells at Nisbet's. The last addition was in 1949 - the Billings lot well No. 3 (see Table No. 5).

Water from the wells flows first into three reservoirs: one is at the pumping station, another at Nisbet's and the third on the Billings lot. A standpipe, where the water is pumped in without any chemical treatment, is on a hill at the pumping station.

The most productive are the two wells at the Waterworks (pumping station), supplying nearly as much water as all the other wells together (see Table No. 5).

The supply from the eight wells (3 - Billings lot, 4 - Nisbet's, 1 - Waterworks) was approximately 77 million gallons in 1936 (Hainstock, Owen and Caley, 1948, p. 19). As the consumption was 67 million gallons the same year, approximately 10 million gallons were wasted.

The flow from all 13 wells was 391 G.P.M. (gallons per minute), in the spring of 1952. That amounts to over 205 million gallons per year, if the flow is persistent. The total consumption was 209,575,500 gallons in 1951, indicating that the flow in that year was at least of the amount indicated.

TABLE NO. 5

TOWN OF AURORA - MUNICIPAL WELLS

No.	Name	Elevation above Sea-Level in Feet	Depth in Feet	Flow of Water in Gallons per Minute	
				1936	1952
1	Gurnett Street	851	Approx. 260		98
2	Waterworks	849		35	85
3	Nisbett's No. 1				20
4	" No. 2				25
5	" No. 3	Approx. 860	119 to 140		5
6	" No. 4				15
7	" No. 5				20
8	" No. 6				25
9	Billing's Lot No. 1	874			5
10	" No. 2	872			28
11	" No. 3	879	91 to 98		25
12	" No. 4	872			15
13	" No. 5	871			25

Thus the town of Aurora has reached the stage when the consumption is as high as the flow of their wells. Drilling of additional wells or pumping from the existing wells, instead of using merely the flow, may become necessary in the near future.

Information on the changes in the flow of the wells of Aurora is incomplete. One of the employees of the Aurora Waterworks reported that the flow of the Gurnett Street well was 200 G.P.M. at the very beginning, but that it has gradually fallen off, the greatest decrease coinciding with the opening of a new high-productive well.

This well gives 110 G.P.M. A local leather factory uses approximately 100,000 to 160,000 gallons per day from its own well, and some additional amount from the town waterworks. Consumption by the leather factory from its own well equals approximately one-fifth of the total consumption of the town of Aurora.

Water from the wells of the Aurora waterworks and the factory is moderately hard to hard (total hardness 172 to 300), with a relatively high amount of iron, but a low amount of chloride (3-6 parts per million). The results of chemical analyses (see Table No. 6) show some changes from year to year, with a slight tendency to decrease of the hardness.

3. Town of Newmarket

The greater part of the town is supplied by municipal wells, though a number of private wells are still in use, particularly shallow wells along the north side of the town and at several places deep artesian wells.

The municipal water supply had its beginning in the nineteenth century, probably before 1890. No records are available concerning the date of drilling of the first wells, and only an old photograph of the waterworks shows one of them.

TABLE NO. 6 - ANALYSES OF WELL WATERS FROM AURORA (IN PARTS PER MILLION)

	Town Wells								Collis Leather Factory Wells			
	Waterworks & Gurnett St.		Nisbet's		Billing's Lot		Composite Samples of All Town Wells					
Year of Analysis	1937[a]	1952[c]	1937[b]	1952[c]	1937[b]	1952[c]	1948[d]	1949[d]	1947[d]	1948[d]	1951[d]	1952[c]
Total Dissolved Solids	280		280		280				305	300	259	
SiO_2	16		12		18							
Fe and Al	6		4		4							
Ca	66		80		86							
Mg	19		23		14							
Na			2		5							
SO_4	13		28		82							
Cl_2	6	6	6	4	6	3			4	5		5
Alkalinity	215	176	245	180	190	176						192
Total Hardness	240	172	300	180	260	204	235	245	255	225	243	208
$CaCO_3$			200		190							
$CaSO_4$					34							
$MgCO_3$			38									
$MgSO_4$			35		69							
Na_2SO_4					4							
NaCl					10							

a - Quoted from H. N. Hainstock, E. B. Owen and J. F. Caley, 1952, p. 26
b - " " " " " " " " " 1948, p. 20
c - Analyses by J. E. Fasken, Central Laboratories, Ontario Department of Health
d - Data received from the Collis Leather Factory, Aurora

The first wells, all artesian and flowing, were located within a few rods of each other along the Canadian National Railway tracks near Fairy Lake. They were pumped by air-lift.

A. D. Bruce's letter to Dr. Ami, March 29, 1907, (G.S.C. files, Ottawa), mentions five flowing wells at Newmarket, 90, 150, 150, 252 and 266 feet deep, 3 to 6 inches in diameter. The total flow from them has been estimated at 90,000 gallons per day with very little if any variation. (Other oral reports give the number of the old wells as high as 20, with a yield of up to 60 gallons per minute from each one.)

As the old well system became insufficient, test-drilling was begun in 1934 by the International Water Supply Company. Seven testholes were drilled, and the so-called old Srigley Street well was erected. It was a flowing artesian well, 185 feet deep, with a screen from the depth of 158 feet down to the bottom. This well yielded 140 G.P.M. at the beginning and 125 G.P.M. later. It has not been in use since August 1950.

Eight more testholes were drilled in the years 1939 to 1941, and the result was the opening of the Cotter Street well on the east side of Fairy Lake in July, 1941. It is 255.5 feet deep and takes water from a deeper aquifer than the Srigley Street well. It is the principal well of the Waterworks of the town of Newmarket and may yield 600 G.P.M., but is pumped only at the rate of 400 G.P.M. The piezometric surface is approximately 40 feet below the surface in the morning, after 8 hours without pumping (-41 feet on September 13, 1952); the drawdown at noon of the same day after four hours of pumping was 22 feet.

In 1948 a new test-drilling program was started and approximately 40 testholes were drilled during the period from 1948 to 1951; and the Water Street well, near the old Waterworks, was opened in 1949. It is 266 feet deep and yields 200 G.P.M. Drawdown is greater than in the Cotter Street well: the piezometric surface was 32 feet below the surface at 8 a.m.,

FIG. 14

YEARLY CONSUMPTION OF WATER FROM MUNICIPAL WATERWORKS IN MILLION GALLONS

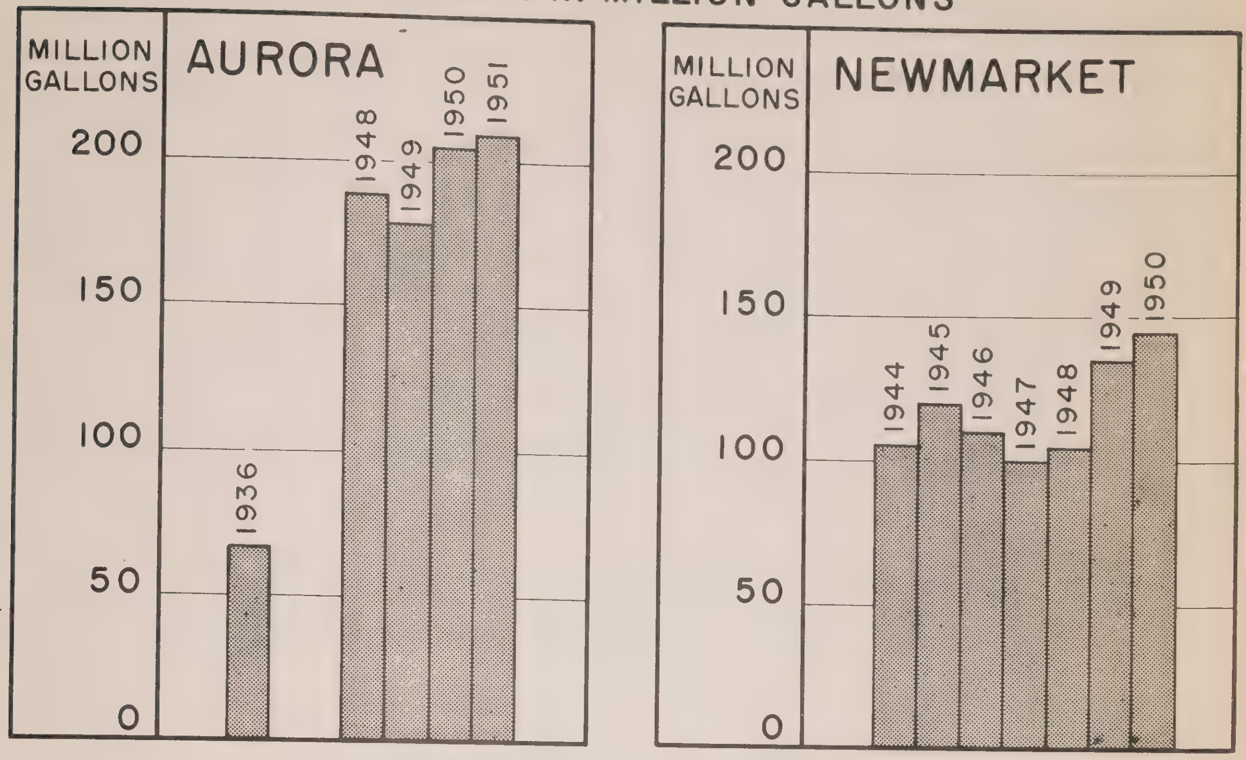
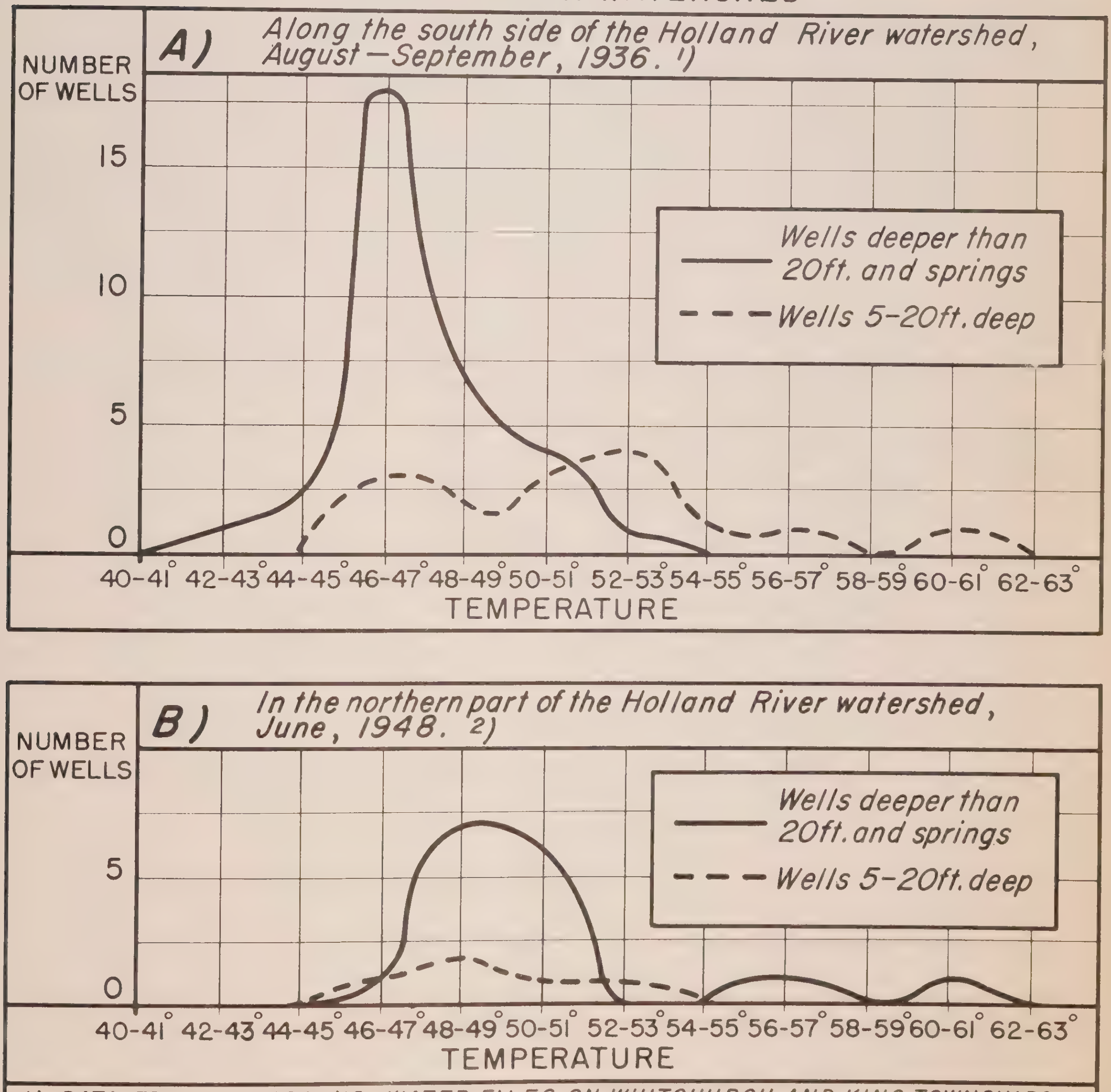


FIG. 25

TEMPERATURE OF WELL AND SPRING WATER HOLLAND RIVER WATERSHED



1) DATA FROM THE GROUND-WATER FILES ON WHITCHURCH AND KING TOWNSHIPS AT THE GEOLOGICAL SURVEY OF CANADA, OTTAWA.

2) DATA FROM THE GROUND-WATER FILES ON GWILLIMBURY EAST TOWNSHIP AT THE GEOLOGICAL SURVEY OF CANADA, OTTAWA.

September 13, 1952, (after 9 hours of interruption of pumping), but the pumping level was 37 feet lower (-69 feet), after four hours pumping, at noon of the same day.

A new well will be brought into production near the old Srigley Street well in the near future.

Thus at the present time there are two municipal wells in operation at Newmarket (the Cotter Street well and the Water Street well, on either side of Fairy Lake). They are pumped only during the day.

The total amount pumped from the Municipal wells in 1950 (including the old Srigley Street well until August 1950) was 145,439,900 gallons. The Cotter Street well gave approximately 2/3 of the supply (105,284,000 gallons), the Srigley well 1/5 (24,978,800 gallons) and the Water Street well 1/10 (16,177,100 gallons).

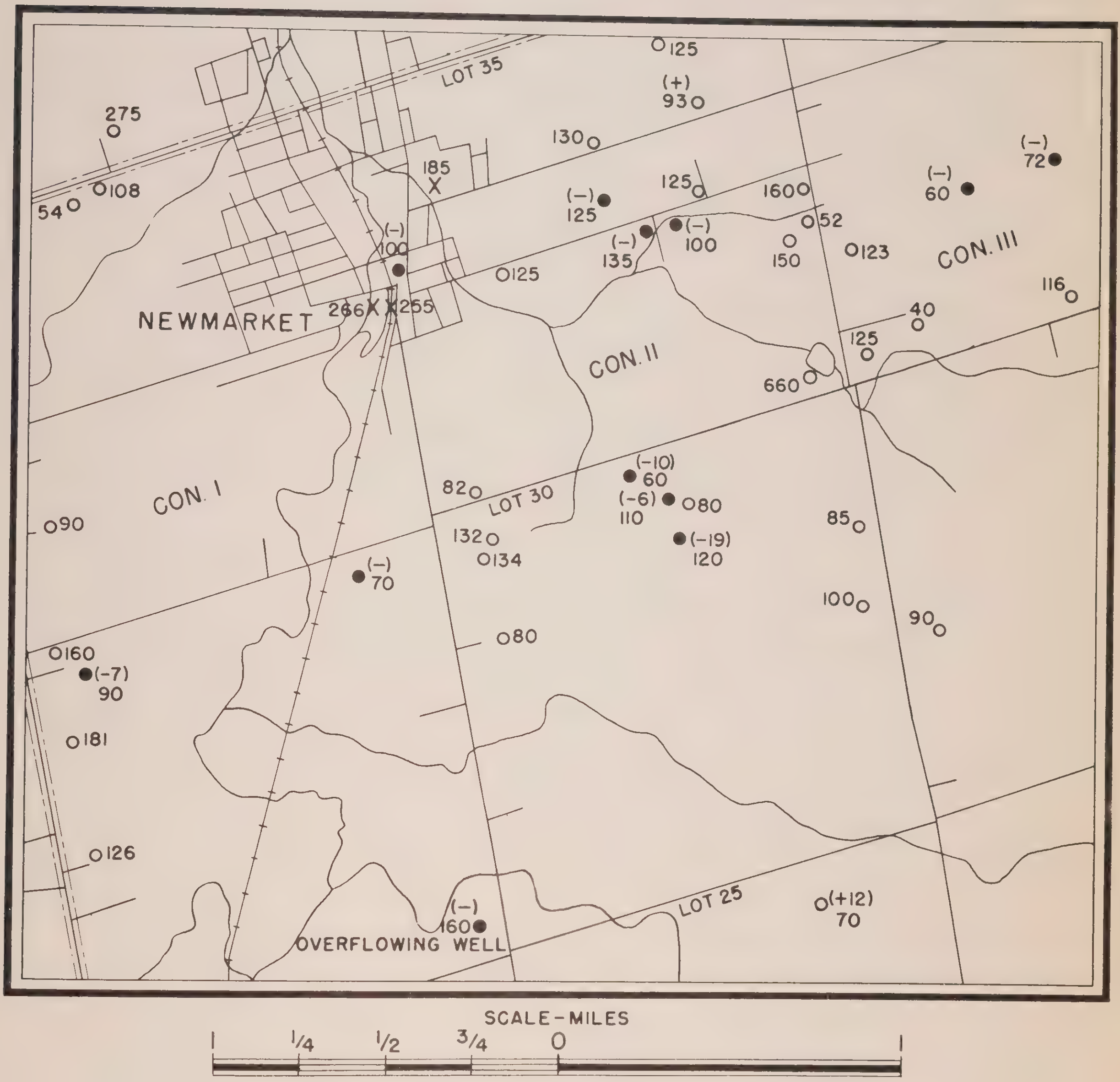
The annual supply of water by the Waterworks of Newmarket has been 100,000,000 to 145,500,000 gallons during the past few years (see Fig. 14). The decrease in consumption in 1946 is apparently due to the closing of the army camp in 1945.

Individual pumping tests of the municipal wells suggest a possible maximal yield more than three times larger than the recent demand. Though the old Srigley Street well has not been in use since August 1950, it is believed that the new Srigley Street well will yield at least as much water as the old one. As calculation of the probable maximal yield of all three wells is based upon individual tests of each well separately the actual maximal yield may be lower if the wells operate simultaneously at their maximal capacity.

Increased pumping for municipal water supply has already lowered artesian pressure in some of the flowing wells in the town and east, south-east and south from it (see Fig. 15). It appears unlikely that a lowering of the water level at a distance of more than one mile from the town wells is caused by

FIG. 15

CHANGE OF ARTESIAN PRESSURE IN DEEP WELLS AROUND NEWMARKET SINCE 1937



X TOWN WELLS.

● ARTESIAN WELLS WITH A REPORTED LOWERING OF ARTESIAN PRESSURE FROM 1937 TO 1952; THE FIGURE IN BRACKETS MEANS THE LOWERING IN FEET.

○ ARTESIAN WELLS WITH NO REPORTED LOWERING OF ARTESIAN PRESSURE FROM 1937 TO 1952; INCREASE IN ARTESIAN PRESSURE INDICATED BY (+) IN BRACKETS.

THE FIGURES AT EVERY WELL SHOW THE DEPTH OF THE WELL.

=·= TOWNSHIP BOUNDARY

their operation, because there are several artesian wells at distances between one and two miles from the town in which no decrease, or even an increase, of artesian pressure has been reported since 1937.

In Whitchurch Township, Con. II, Lots 29 and 30, at a distance of approximately one mile from the town wells, there are three wells which were flowing in 1937 and which ceased to flow about 1940, as reported by their owners, as a result of the drilling of testholes and the Cotter Street well at Newmarket. Their water level in 1952 was 6 to 19 feet lower than in 1937. Hainstock, Owen and Caley, 1952, p. 22, write also that "The supply from some wells was appreciably decreased when the wells used by the Town of Newmarket were drilled, especially the new well drilled in 1937" (probably the old Srigley St. well).

If the lowering of piezometric surface continues, the Town of Newmarket will have to drill additional wells at some distance. As there has been no decrease in production in surrounding wells north and north-east from the Srigley Street well (see Fig. 15, the northern town well) and as one of the testholes north of the town (the Green Lane well, drilled 1940) has a very strong flow, it is suggested to look for additional water supply north from the recent wells, when it becomes necessary.

Chemical analyses of the town wells (see Table No. 7) of 1950 show that the water is moderately hard, with a small amount (0.15 - 0.20 p.p.m.) of fluorine (which is supposed to decrease tooth-decay), but with a relatively high amount of chloride: 77 p.p.m. in wells closer to the Holland River and 47 p.p.m. in the Srigley Street well. As the Pleistocene deposits of the area, from which the water is pumped, have very low chloride content, this relatively high amount suggests some pollution, probably from the Holland River (see Chapter 7 and Fig. 6). Even more chloride has been found in the old wells (90 p.p.m. in 1937, see Hainstock, Owen and Caley, 1952, p.30),

TABLE NO. 7

ANALYSES OF WATER FROM THE TOWN WELLS OF NEWMARKET

By the Department of Mines and Technical Surveys, March 23, 1950

	Cotter St. Well	Srigley St. Well	Water St. Well
Description of Water Sample			
Temperature	9°C.	9°C.	8°C.
p^H	8.4	8.0	8.4
Colour	7	10	5
Turbidity	0.5	3.0 (f.sand)	0.4
Specific Conductance	600.6	616.9	596.5
Results of Water Analyses in p.p.m.			
Residue:			
Dried at 105°C.	343.6	380.8	347.0
Ignited at 550°C.	325.6	349.8	325.6
Alkalinity:			
Bicarbonate	14.0	6.0	12.6
Carbonate	198.0	257.0	197.5
Ca	47.3	47.5	41.7
Mg	17.1	19.5	16.8
Na	63.0	70.0	68.0
K	1.3	2.0	1.7
Fe, diss.	0.07	0.13	0.2
SO_4	12.5	11.2	10.2
Cl	77.3	47.3	76.7
NO_3	0	9.7	3.1
F	0.15	0.2	0.2
HCO_3	207.4	298.9	210.1
CO_3	16.8	7.2	15.1
SiO_2 grav.	20.2	26.0	20.4
SiO_2 col.	17.8	19.3	17.7
Hardness:			
Carbonate	188.4	198.7	173.1
Non-carbonate	0	0	0

together with a high amount of iron (20 p.p.m. together with Al), probably from the rusty old pipes. The iron content was much lower in 1950 (0.07 to 0.2 p.p.m., see Table 7).

Because of some indications of pollution of the Cotter Street well its water has been chlorinated continuously since it has been used for municipal supply. Water from the Water Street well has been chlorinated since the summer of 1952.

CHAPTER 7

CHEMICAL ANALYSES OF WATER AND THE PROBLEM OF CONTAMINATION

Water samples from 112 wells in the Holland River Watershed were analysed in 1936, 1937 and 1948 by The Geological Survey of Canada (see results of most of these analyses in Hainstock, Owen and Caley, 1948 and 1952).

A number of analyses indicated that shallow, non-artesian wells have a higher amount of chloride; and, as a rule, a higher degree of hardness than the deeper artesian wells. The increased amount of chloride in shallow wells may mean contamination by surface waters, because sewage carries a higher percentage of chloride. Excessive hardness in water of shallow wells may be explained by a higher amount of carbon dioxide in the surface water and the resulting increase in carbonates, particularly lime, dissolved from the soil.

Some deep artesian wells, particularly in the Newmarket area, showed also a relatively high amount of chloride. In order to explain this phenomenon and to find whether the amount of chloride and the degree of hardness could be used for correlation of aquifers, water samples from 69 more wells and 4 surface water samples were analysed in 1952 (see Table No. 8).

Repeated analyses of deep wells with a low amount of chloride do not show much variation in the chloride content (see Table No. 6). Wells with a relatively higher content of chloride, e.g., Nos. 55 and 57 (see Table No. 8), have greater variation, though the time interval between analyses did not exceed two months.

Fig. 16 shows that a low content of chloride (0-20 p.p.m.) is more abundant among wells deeper than 50 feet than among shallow wells. The percentage of wells with the low amount 0 - 10 p.p.m. of chloride gives even more striking differences:

FIG. 16

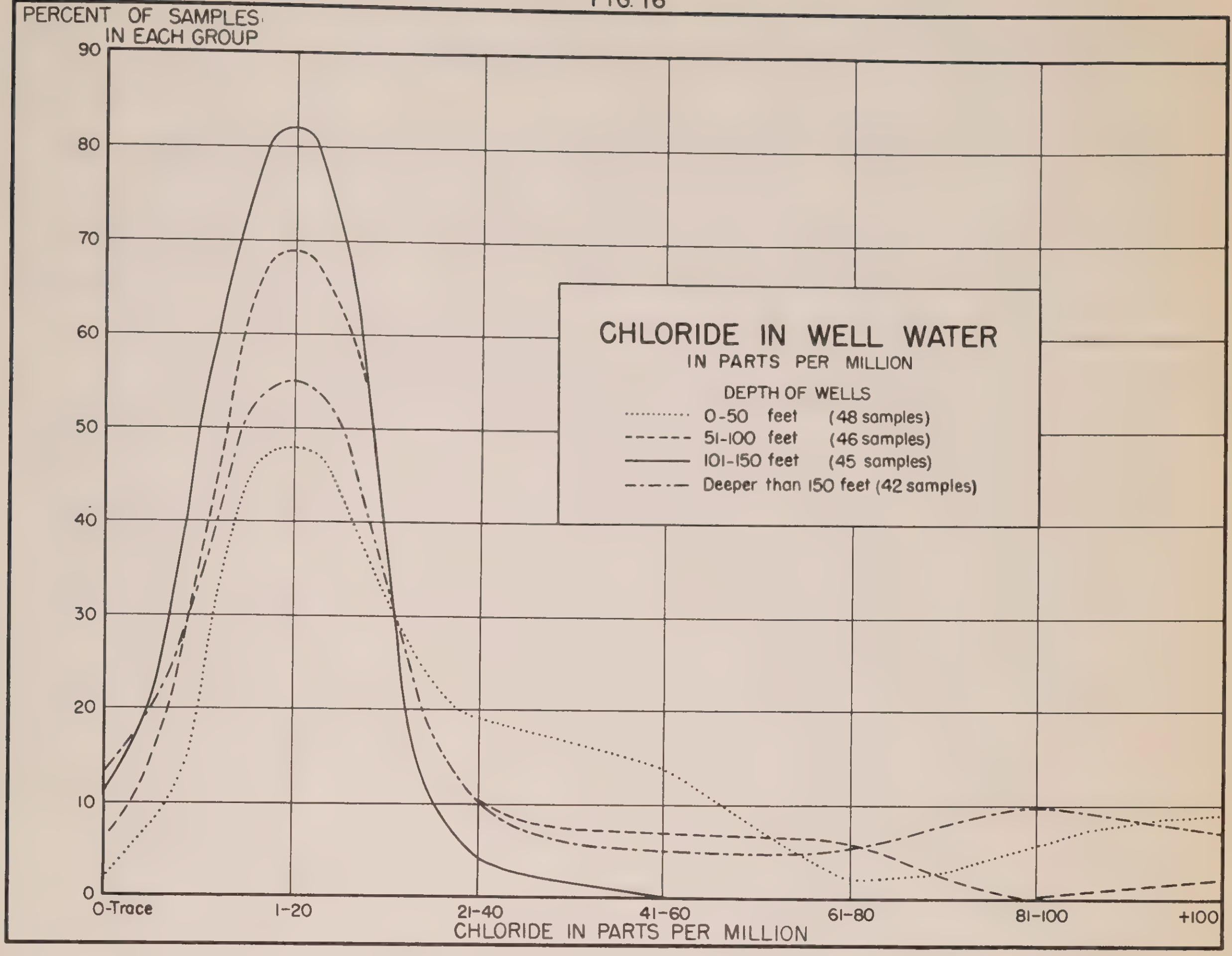
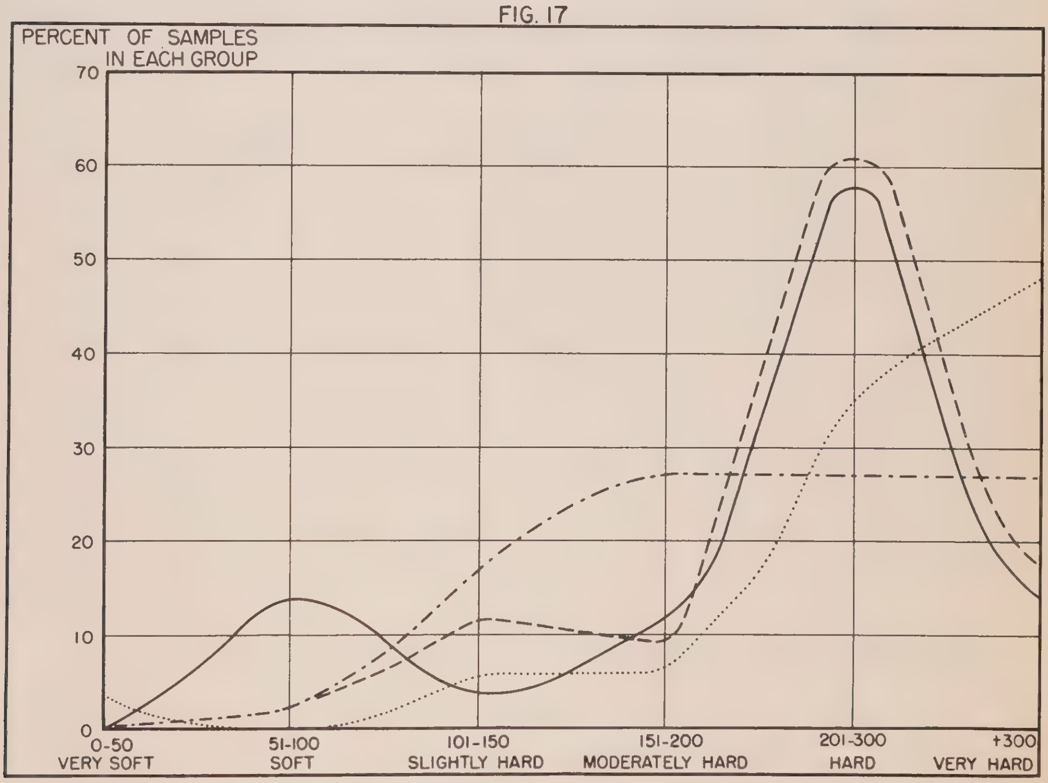


FIG. 17



TOTAL HARDNESS OF WELL WATER
IN PARTS PER MILLION

DEPTH OF WELLS
0-50 feet (48 samples)
51-100 feet (46 samples)
101-150 feet (45 samples)
Deeper than 150 feet (42 samples)

Depth of wells	Per cent of wells with 0-10 p.p.m. Cl.
0 - 50 feet	35%
51 - 100 feet	62%
101 - 150 feet	82%
Deeper than 150 feet	58%

Thus a definite decrease of chloride is from shallow wells down to the depth of 101 - 150 feet. Some of the deeper wells show an increase of chloride again. As most of these deep wells with increased amount of chloride are either in densely populated areas (Newmarket, Holland Landing, Sharon) or in depressions, for instance the Holland River Valley above Newmarket, it is probable that contamination through surface waters has increased their content of chloride. Another possibility is that the chloride content derives from salty water in bedrock at a greater depth, since Hainstock, Owen and Caley (1948, p. 18) state that water from bedrock wells in townships adjacent to King Township "contains a large amount of sodium chloride".

An analysis of water from a bedrock well of the Holland River Watershed (see No. 49, Table No. 8) shows, however, a relatively low proportion of chloride (38 p.p.m.), though still slightly higher than water from most of the deep wells. Scarcity of bedrock wells in the Holland River Watershed does not permit of drawing definite conclusions as to whether a part of the chloride content in deep wells of this watershed derives from bedrock.

The map, which shows the proportion of chloride in water of deep wells, creeks, and Reesor Lake (Fig. 6), indicates that the principal area with high chloride content is in the Holland River Valley at Newmarket and south of it; that another area is at the north-west end of Holland Landing, and in scattered wells north-west of these two areas. The flow of artesian groundwater in the Newmarket area, as indicated by the

TABLE NO. 8 (A)

ANALYSES OF WELL WATER FROM THE HOLLAND RIVER WATERSHED

No.	Township Village or Town	Depth in Feet	Type of Well *	Results of Analyses in Parts per Million				
				Total Hard-ness	Chlo-rides	Alkalinity		
						Total	Bicar-bonate	Car-bonate
1	King	80	na	256	6	220	172	48
2	"	75	na	165	4	144	96	48
3	"	17	na	180	3	140	108	32
4	"	115	nfa	80	+			
5	"	289	nfa	160	+			
6	"	280	fa	160	4	160	120	40
7	"	58	nfa	280	48	196	164	32
8	"	330	nfa	370	37	260	196	64
9	"	70	fa	150	+			
10	"	300	fa	76	63			
11	Whit-church	138	nfa	270	5	212	172	40
12	"	40	na	290	73	172	132	40
13	"	84	na	245	103	164	132	32
14	"	70	nfa	240	3	184	160	24
15	"	125	nfa	64	3			
16	"	127	fa	76	2			
17	"	160	fa	134	+			
18	"	126	nfa	290	33	204	172	32
19	"	140	fa	96	132			
20	"	181	nfa	425	43	280	216	64
21	"	90	nfa	420	69	256	248	8
22	"	90	fa	110	6	132	108	24
23	"	245	fa	242	182			
24	"	160	nfa	124	+			
25	"	100	nfa	104	+			
26	"	85	nfa	200	4			
27	"	27	na	318	57			
28	"	90	nfa	252	4			
29	"	123	fa	210	2	188	164	24
30	"	42	nfa	44	+			
31	"	35	na	512	6			
32	"	75	na	64	2			
33	"	104	nfa	86	2			
34	"	150	na	178	2			
35	"	29	na	114	11			

* na = non-artesian
fa = flowing artesian
nfa = non-flowing artesian

TABLE NO. 8 (B)

ANALYSES OF WELL WATER FROM THE HOLLAND RIVER WATERSHED

No.	Township Village or Town	Depth in Feet	Type of Well *	Results of Analyses in Parts per Million				
						Alkalinity		
				Total Hard-ness	Chlo-rides	Total	Bicar-bonate	Car-bonate
36	Aurora	260	fa	172	6	176	152	24
37	"	120-140	fa	180	4	180	172	8
38	"	90-100	fa	204	3	176	168	8
39	"	294	fa	208	5	192	160	32
40	Gwillimbury E.	50	na	530	83	272	208	64
41	"	80	nfa	260	13	208	168	40
42	"	130	nfa	505	28	360	328	32
43	"	45	na	370	33	340	272	72
44	"	265	nfa	195	5	176	144	32
45	"	112	nfa	90	2	116	84	32
46	"	370	nfa	174	2			
47	"	23	na	640	53	272	200	72
48	"	220	nfa	170	5	172	140	32
49	"	960	fa	140	38			
50	"	249	nfa	188	164			
51	"	8	na	165	6	136	120	16
52	"	172	nfa	200	+			
53	"	150	fa	186	3			
54	"	116	nfa	108	+			
55	Holland Landing	80	nfa	250-416	65-90	228	156	72
56	"	17	na	550	161	300	244	56
57	"	193	nfa	560-636	89-126	324	252	72
58	"	116	nfa	144	11	164	140	24
59	"	285	nfa	232	32	216	184	32
60	"	207	fa	180	13	180	140	40
61	"	70	fa	178	10	176	144	32
62	"	63	fa	174	5	176	144	32
63	Sharon	150	nfa	168	+			
64	"	90	nfa	186	+			
65	"	26	na	150	46			
66	"	76	nfa	212	37			
67	"	62	nfa	300	24			
68	"	178	fa	104	1			

* na = non-artesian
fa = flowing artesian
nfa = non-flowing artesian

TABLE NO. 8 (C)

ANALYSES OF CREEK AND LAKE WATER
FROM THE HOLLAND RIVER WATERSHED

No.	Location	Township	Con.	Lot	Results of Analyses in Parts per Million	
					Total Hardness	Chloride
1	Reesor Lake	Whitchurch	IV	12	88	+
2	Creek 1½ miles north of Aurora	"	I	27	230	90
3	Creek 1½ miles south of Pine Orchard	"	V	25	188	+
4	Holland River, 1 mile north of Newmarket	Gwillimbury E.	II	5	230	104

changes in artesian pressure (see Fig. 15) appears to be from south-east towards north-west. Fig. 6 shows also a depression in the bedrock surface along the same direction through Newmarket, which may have aided the underground flow towards the north-west. That is the reason why the high-chloride area around Newmarket has been connected with the similar area north-west of it on the same map, though the relationship has not been verified.

Analyses of creek water between Newmarket and Aurora show also a relatively high content of chloride (90 p.p.m.). The highest proportion of chloride is also in those wells at or above Newmarket, which are nearer to the Holland River (see Fig. 6).

It is accordingly concluded that the relatively high amount of chloride in the deep wells around Newmarket derives principally from infiltration of contaminated creek water into the deeper aquifers. This slightly contaminated ground water is carried in the north-eastern direction by the general ground-water flow along the depression in the bedrock surface through Newmarket.

Another place of contamination is at Holland Landing, probably both from the local sewage of the village* and from the Holland River. This slightly contaminated ground water is carried also toward the north-west. An unduly high chloride content in deep wells is reported also from Sharon and from some scattered farms, probably indicating local contamination.

The relatively easy infiltration of surface waters at Newmarket may be explained by lack of the protective cover of the clayey Lake Schomberg deposits over the sandy till

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* Mrs. A. .... complained, for instance, that their well, 34 feet deep, was heavily contaminated by a septic tank of their neighbour south from their place. The water of their well becomes black when exposed to air and is unfit for domestic use. Their other well, 17 feet deep, located on the north side of the house, does not show these signs of contamination.

in the river bed - it has been eroded. As a result, surface waters penetrate the relatively pervious sandy lower till and contaminate the deeper aquifers. As some wells on the north-west side of Holland Landing indicate a similar thinning of the protective Lake Schomberg clay, it is possible that the sandy, permeable deposits of Lake Algonquin and the Holland River are connected with the underlying lower till and serve as conductors of contamination towards the deeper aquifers in the lower till.

The fact that there is no corresponding increase of chloride in the deep wells of another densely populated area, the town of Aurora, may be explained by the presence of a thick protective cover of Lake Schomberg deposits (see Fig. 8a). As some isolated wells of old settlements along Highway No. 11 indicate, the deeper aquifers may become contaminated through dug wells or along casings of old drilled wells. For this reason care must be taken to avoid future contamination of Aurora wells either from the exposures of the sandy intake area south of the town or from places where the protective cover of clay has in some way been penetrated. Such places, with well-pipes penetrating the clay, are, for instance, the areas of town wells, and care should be taken that garbage is not dumped beside the wells, as unfortunately has happened near Nisbet's wells.

Fortunately the principal source area of ground water for the central, eastern and northern part of the watershed is the wide sand plain (area "C" on the map, Fig. 7) in the east, which is, for the most part, covered by pine forests and shows a low content of chloride both in creek water and in most wells. (Bacteriological analyses would be more suitable for telling the quality of water, but the proportion of chloride has been used as an indirect indicator, because of the large number of available records of analyses from 1936 to 1948).

Approximately 73 per cent of the water samples analysed from wells of the Holland River Watershed are hard or very hard (see Fig. 17). The shallow wells (0 - 50 feet) show the highest percentage of very hard water (48 per cent of them having very hard water). Hard water dominates in wells, 51 to 150 feet deep (57 - 61 per cent of these wells). If the group of wells deeper than 150 feet did not include the contaminated high-chloride wells of the Newmarket area and some other places, their majority would be spread among the classes of moderately hard and hard water. Both the shallow wells and the deep wells contaminated by surface waters have relatively high proportions of chloride and a high degree of hardness.

A small group of wells with soft water exists among those which are 101 - 150 feet deep. They are either artesian wells from the area east of Aurora or some deep non-artesian wells from the sandy eastern area.

The conclusion is that chloride and hardness of water decrease generally with the depth in the Pleistocene wells of the Holland River area, except in the case of the contaminated deep wells. As the greatest variation is in the chloride content, this may be used as an indicator of contamination from surface waters if there is not another source of chloride (salt-water from deep bedrock).

CHAPTER 8

ARTESIAN WATER

Artesian wells are wells which flow naturally because the water is under pressure; in the country they are usually called "flowing wells".

The strongest flow is in the following wells

(a) Abandoned testhole, 1.5 miles north of Newmarket, west side of Holland River, Gwillimbury East Township, Con. II, Lot 5 ("The Green Lane Well"). Attempts have been made to cap, but unsuccessfully; and a funnel-like depression surrounds the well. The flow from the testhole is approximately 29,000 gallons per day.

(b) A flow of approximately 12,000 gallons per day is recorded from a well two miles south of Newmarket* (see the southernmost well on Fig. 15).

(c) Several flowing wells are located in the town of Newmarket. One well with a flow of 8,000 gallons per day, and another with a flow of 5,000 gallons per day during the time when the factory does not operate, may be mentioned as examples.

(d) Holland Landing has also several flowing wells. One of them is on the south bank of the Holland River, west of the bridge, with a flow of 8,000 gallons per day. Water from this well is first stored in a tank, from which it overflows. It is reported that water from this well has been used in dry seasons by neighbours. Another well has a flow of approximately 3,000 gallons per day, a third east of Highway No. 11, on the north-west side of Holland Landing, also has a flow of 3,000 gallons per day. Overflow occurs also at an industrial plant, Holland Landing, at present, but the entire flow will be used in the near future.

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* Flow of this well has decreased from 16 G.P.M. in 1937 to 8.5 G.P.M. in 1952. This decrease may be caused by the permanent flowing of the well, which lowers artesian pressure.

(e) A heavy flow, approximately 17,000 gallons daily, takes place at Sharon. The owner plans to build a pond, using his flowing well as the source of water.

(f) A strong-flowing well, with an overflow of 22,000 gallons daily, is located near the north-west corner of the watershed, at the Federal Farms in the Holland Marsh, King Township, Con. II, Lot 121.

The total flow from all the wells investigated is approximately 140,000 gallons per day or over 50 million gallons per year. That is equal to one-third of the yearly water supply of Newmarket.

This flow contributes materially to the lowering of artesian pressure in the area of Newmarket - Holland Landing - Sharon. Consideration should be given to the possibility of capping the flowing wells where it is possible, particularly those wells which have a strong flow.

CHAPTER 9

CHANGES OF WATER LEVEL IN WELLS

1. Seasonal Fluctuations

Every well shows seasonal fluctuations in water level. "The water tables in Ontario are usually highest in the spring when melting snow and spring rains provide an excess of water available for recharge at a time when the demands of vegetation on soil water are at a minimum. Evaporation and transpiration increase during the summer months with the result that, after the soil needs are satisfied, little or no water may be available to move down into the saturated zone." (A. K. Watt, 1952, p. 15). Mr. Watt states that the nearest observation well of the Ontario Department of Mines north of the Holland River Watershed is at Angus, west of Barrie, and that the highest water level there has been recorded from March to June and the lowest in September or August. The observation wells south of the watershed, in the Toronto area, are so near to heavily pumped municipal wells that their water level does not reflect natural fluctuations.

No systematic long-term recordings of water level in wells have been made in the Holland River Watershed, with the exception of four measurements at intervals of one month in a well in Whitchurch Township, Con. IV, Lot 14, in 1937 (Hainstock, Owen and Caley, 1952, p. 19). Some similar measurements are reported in the same paper from neighbouring areas. Hainstock, Owen and Caley (1952, p. 18) write the following statement about these measurements: "The water levels in a number of wells, in Whitchurch and adjoining townships, were measured periodically from June to September of 1937 and for some wells also in August 1936 ... These wells were not in use so that the fluctuations in water levels is believed to be the direct result of precipitation, evapo-transpiration and other natural causes. A considerable amount of precipitation

FIG. 18

CHANGES OF WATER LEVEL IN 13 SELECTED WELLS OF WHITCHURCH, PICKERING, SCARBOROUGH, MARKHAM & VAUGHAN TOWNSHIPS 1936 – 1937

The level of June 5–7, 1937 is taken as zero.

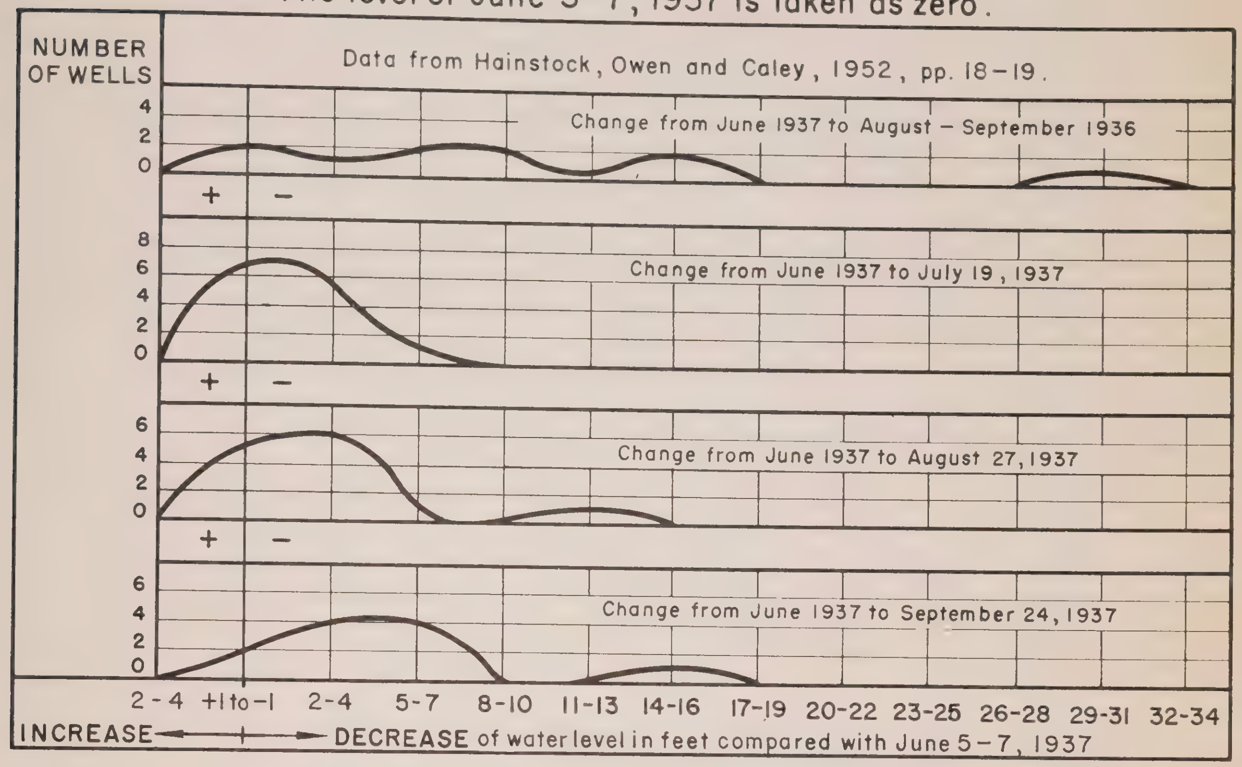


FIG. 19

CHANGES OF WATER LEVEL IN DUG WELLS FROM BEGINNING OF JUNE TO MIDDLE OF SEPTEMBER, 1952. HOLLAND RIVER WATERSHED

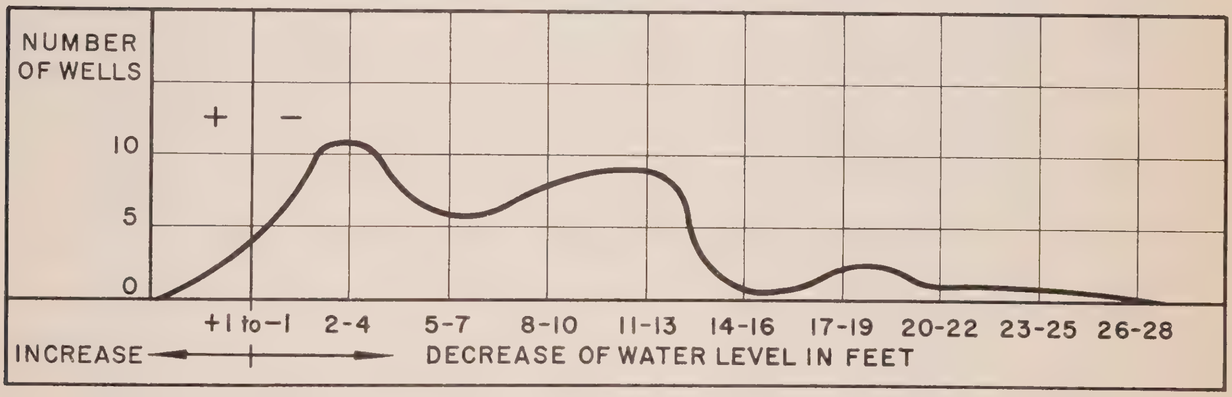
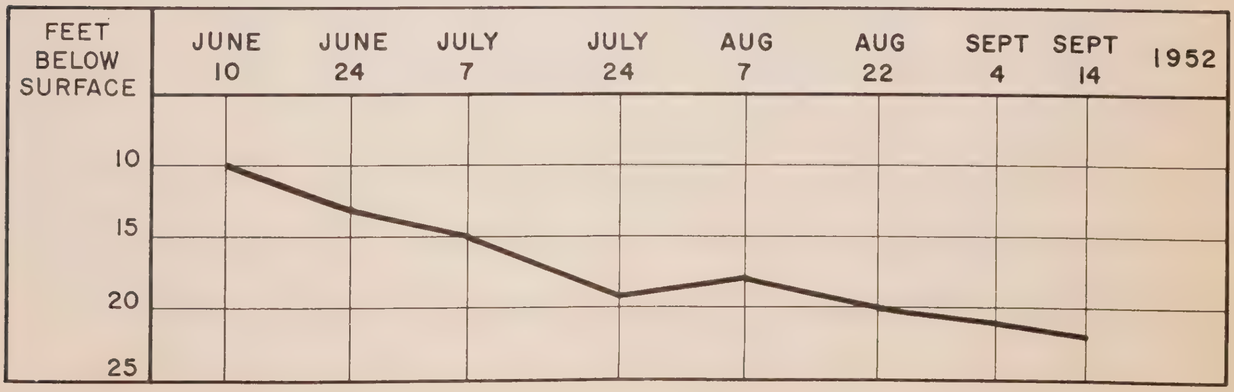


FIG. 20

CHANGES OF WATER LEVEL IN A WELL ON THE PROPERTY OF L. WILSON, WHITCHURCH TOWNSHIP, CON. I, LT. 22 HOLLAND RIVER WATERSHED



occurred during the months that the wells were measured." The results of these measurements are given on pages 18 and 19 of the same report, but without further evaluation. Fig. 18 is an attempt to show fluctuations of water level in the above wells graphically, assuming the measurements of the beginning of June 1937 as zero. The low number of wells investigated (13) is not sufficient for a statistical evaluation. The diagrams (Fig. 18), however, show clearly that water level in the measured wells has a tendency to fall from June to September, 1937. The very low precipitation of the summer of 1936, together with above-average temperatures (see Fig. 5), explains why the water level was even lower in September and August of 1936 (compared with the same months in 1937 - see Fig. 18).

In order to obtain further data on seasonal fluctuations of water level in wells, 42 of those wells which were measured in June 1952 were remeasured in the middle of September of the same year (see Table No. 9). Fig. 19 shows that in nearly 90 per cent of the remeasured wells the water level dropped 1 to 12 feet, with two modal groupings around 3 and 11 feet; some were lowered as much as 24 feet. The lesser drop (0 to 7 feet, mostly about 3 feet) was recorded particularly in wells in the sandy part of the Holland Marsh, in the sandy Holland River Valley, or in other depressions. The second group of wells, in which a drop of 8 to 12 feet (or even up to 24 feet) was recorded, are in the hilly clay or till areas of the watershed, or the clayey part of the Holland Marsh.

Regular measurements were made in Mr. L. Wilson's abandoned well, Whitchurch Township, Con. I. Lot 22, at intervals of 10 to 17 days, from June 10 to September 14 (see Fig. 20<u>a</u>). It is a typical clay well, dug in the Lake Schomberg silty clay. Fig. 21 shows that the first strong drop occurred in the second half of July; then the increased precipitation of July caused a slight recovery towards the beginning of August, which was

TABLE NO. 9

MEASUREMENTS OF WATER LEVEL IN DUG WELLS
HOLLAND RIVER WATERSHED
(IN FEET BELOW EARTH SURFACE)

(Numbers of wells correspond to those in the G.S.C. and O.D.P. & D. files)

Township and No. of Well	Time of Measurement				Depth of Well		
	Sept. 1936	July 1937	Aug. 1948	June 1952	Sept. 1952	1936 -37	1952
King Township							
17-1-14	10			12.5	15	12	17
5-1-19	15			7	10	26	27
7-1-20				11	21	23	23
8-1-20				8		43	44
10-1-25		8		(increase)		18	18
11-1-25		43	13	30	41	52	50
13-1-25		10		7		28	28
4-1-26		10		6		17	17
10-1-27		18		19	30	40	42
18-1-29		11		15	25	49	52
4-1-32		30 (est)		28	48	56	58
5-1-32		9		9	14	24	26
9-1-33		21	29	9	33	37	44
10-1-33		17		14	26	33	34
13-1-35		22		10	29	42	44
15-1-35		11		3	9	31	22 (silted)
17-1-35		10	17	7	18	34	36
12-2-20	20			14		21	19
13-2-20	8			2		9	7
1-2-21	6			3		7	11
6-2-21	32			21		34	33
11-2-22		17		14		19	19
12-2-23		27		22		65	66

Township and No. of Well	Time of Measurement				Depth of Well		
	Sept. 1936	July 1937	Aug. 1948	June 1952	Sept. 1952	1936 -37	1952
King Twp.							
15-2-24		28		25		34	37
21-2-25		16		10		24	25
23-2-25		42		34		43	46
6-2-27		6		8		22	27
7-2-27		9		7		20	25
8-2-27		22		18		24	26
5-2-33		21		18		24	26
13-3-20	28			21		30	38
6-3-22	51			44		60	60
13-3-24		32		31		39	42
18-3-25		31		19		35	39
3-3-26		31		19		35	39
4-3-26		17		8		17	17
7-3-27		24		10		29	29
9-3-27		19		11		24	27
10-3-28		20		11		26	28
Whitchurch Township	Aug. 1936						
6-1-18	10			7		20	15
7-1-18	16			6		20	11
9-1-20		13		15.5		23	30
6-1-21		10		8	21	25	26
8-1-21		4		4		8	8
12-1-21		38		21		55	58
14-1-22		18		7		41	
1-1-26		8		7		13	14
14-1-29		24		21		37	40
17-1-30		27		24		48	52
24-1-30		13		11		16	
1-1-31		5		4	5	15	15

Township and No. of Well	Time of Measurement				Depth of Well		
	Aug. 1936	July 1937	Aug. 1948	June 1952	Sept. 1952	1936 -37	1952
Whitchurch Twp.							
3-1-31		6		4		9	8
14-1-33		16		16		29	30
41-1-35		18	18	13		26	29
7-2-15	45			37		50	46
9-2-15	47			46		49	51
5-2-18	17			8		22	22
10-2-19		24		21		28	33
1-2-21		16		12		41	41
2-2-21		9		8		28	32
5-2-21		4		5		14	16
9-2-22		3		3		20	19
11-2-22		16		14		33	40
14-2-23		25		4		35	38
16-2-23		9		8		19	23
21-2-25		26		15		39	40
23-2-25		15		15		42	44
4-2-27		22		10		45	45
6-2-27		11		12		30	28
7-2-27		9		5.5		12	12
13-2-29		15		13		42	43
20-2-30		22		20		35	40
3-2-31		10		7		13	14
26-2-33		17		17		33	35
27-2-33		9		5		16	17
30-2-33		16		12		25	26
31-2-33		22		12		26	28
43-2-34		10		7		25	27
6-3-13	5			2		7	7
9-3-14	55			50		60	55
15-3-15	20			12		30	28

Township and No. of Well	Time of Measurement					Depth of Well	
	Aug. 1936	July 1937	Aug. 1948	June 1952	Sept. 1952	1936 -37	1952
Whitchurch Twp.							
16-3-15	18			10		19	25
17-3-15	22			18		25	28
1-3-16	7			6		9	16
6-3-16		4		4		12	14
11-3-18		10		10		18	21
13-3-19		20		18		40	42
17-3-19		30		43		72	
19-3-20		15		16		16	17
20-3-20		30		20		37	42
21-3-20		7		6		33	36
4-3-21		40		19		70	77
7-3-22		23		19		33	39
8-3-23		21		11.5		25	27
9-3-23		13		10	21	27	29
10-3-23		9		9		18	24
11-3-24		30		14		36	36
13-3-24		49		51		52	58
14-3-24		30		9		34	39
17-3-24		7		8		24	35
1-3-26		19		11	21	38	37
11-3-27		36		42		50	55
12-3-28		26		19		41	42
13-3-28		26		21		35	41
14-3-28		30		10		45	48
15-3-29		16		14		24	25
17-3-30		7		7		8	9
4-3-31		18		14		23	
6-3-31		28		20		40	
10-3-32		50	48	44		55	57
15-3-32		20		10		40	42

Township and No. of Well	Time of Measurement					Depth of Well	
	Aug. 1936	July 1937	Aug. 1948	June 1952	Sept. 1952	1936 -37	1952
Whitchurch Twp. 16-3-32		19		16		31	32
18-3-33		10	10	3		16	13
22-3-34		48	42	51		52	52
17-4-10	14			14		27	27
10-4-14	28			24		30	32
1-4-16	25			15		26	26
6-4-16		12		16		25	28
13-4-19		10		10		15	16
2-4-21		20		21		38	
4-4-22		14		17		22	
5-4-22		16		11		26	
7-4-22		7		9		12	14
9-4-23		6		9		60	
10-4-23		10		10		18	18
11-4-23		10		10		18	18
12-4-24		12		18		20	22
15-4-24		21		21		30	43
18-4-25		7		7		14	14
19-4-25		9		9		17	12
				July 1952			
20-4-25		66		64		71	71
21-4-25		32		30		39	48
1-4-26		25		14		50	55
3-4-26		27		25		34	38
4-4-26		29		30		36	37
5-4-27		19		19		36	37
6-4-28		37		24		43	48
14-5-15	19			19		21	23
1-5-21		9		8		18	13
4-5-21		12		9		14	13
6-5-22		8		8		11	13

Township and No. of Well	Time of Measurement					Depth of Well	
	Aug. 1936	July 1937	Aug. 1948	July 1952	Sept. 1952	1936 -37	1952
Whitchurch Twp.							
7-5-22		4		5		9	15
8-5-23		7		8		10	15
9-5-25		11		9		26	31
10-5-25		26		27		28	39
14-5-25		12		14		20	32
2-6-11		16		16		24	24
4-6-12		19		9		20	
5-6-12		15		6		25	22
6-6-12		12		2		14	10
7-6-13		17		12		24	22
8-6-14		5		9		20	23
1-6-16		11		12		16	14
7-7-12		4		2		24	
8-7-12		10		12		38	39
15-7-14		5		8		18	25
16-7-14		18		7		23	24
19-7-15		24		25		29	29
6-7-17		2		4		5	15
10-7-18		9		9		12	14
12-7-19		10		8		13	
13-7-20		22		17		25	25
15-7-20		12		12		18	17
16-7-20		20		20		24	
21-7-20		10		8		13	16
3-7-21		13		17		20	18
5-7-23		5		7		8	11
		June 1937					
17-8-15		2		8		10	13
52-8-18		5		5		10	10
59-8-19		16		16		18	23

Township and No. of Well	Time of Measurement					Depth of Well	
	Aug. 1936	June 1937	Aug. 1948	July 1952	Sept. 1952	1936 -37	1952
Whitchurch Twp. 60-8-19		16		16		20	21
62-8-20		12		10		14	14
64-8-20		19		17		20	28
68-8-20		23		23		27	26
21-9-15		6		6		9	17
22-9-15		34		39		35	41
16-9-17		7		9			20
27-9-19		5		3		40	28
2-9-21		28		21		30	29
Gwillimbury E.	Aug. 1936	June 1937	June 1948	June 1952	Sept. 1952	1948	1952
29-1W-115			4.5	4	7.5	8.5	7
45-1E-101			14	15		46	46
57-1E-107			8	7	24	41	42
57a-1E-107			7	9		47	50
58-1E-108			7	7		20	20
59-1E-109			8	10		26	29
59a-1E-109			6	6		17	19
60-1E-110			7	5	18	23	24
60a-1E-110			5	9		33	30
61-1E-111			5	3		12	12
62-1E-111			12	13	29	38	
63-1E-112			13	11		30	30
63a-1E-112			0	0			2
64-1E-113			6	6		22	25
68-1E-115			7	5		14	16
69-1E-115			7	5	17	16	18
70-1E-116			5	5	8	9	8
71-1E-116			6	6		10	10

Township and No. of Well	Time of Measurement					Depth of Well	
	Aug. 1936	June 1937	June 1948	June 1952	Sept. 1952	1948	1952
Gwillimbury E.							
75-1E-116			5	6	9.5	10	9
79-1E-120			6	4.5	13.5	16	16
80-1E-121			4	4		13	15
81-1E-121			1	2		6	9
82-1E-121			4	3	dry	10	10
92a-2-3			7	7.5	14.5	27	30
94-2-4			20	20		38	40
109-2-12			16	18		30	39
121-2-16			5	5		9	9
122-2-17			23	28		32	36
125-2-19			22	26		42	50
129-2-21			9	8		39	40
132-2-21			8	6	11	16	14
178-3-12			7	8		14	13
189-3-17			12	19		20	26
192-3-18			12	11		22	22
Holland Landing							
3			9	8		21	7
12			3	4	7	11	11
13				4.5	6.5	32	34
14			4	5	7	16	17
19			7	8		11	11
21			11	10	17	30	31
23			6	8		23	23
40			12	13	24.5	45	46
Newmarket North							
3				7	9		26
9				18	21		27
11				12	18		34

Township and No. of Well	Time of Measurement					Depth of Well	
	Aug. 1936	June 1937	June 1948	June 1952	Sept. 1952	1948	1952
Newmarket North							
14				9	18		20
30				9	12		15
39				7	6		11
59				8	12		36
61				4	5		8
Queensville							
2			25	30		35	38
9			27	30		36	40
17			34	35		43	44
27			5	5		16	21
30			5	4		42	42
Sharon							
36				6	15.5	17	17

followed again by the continued falling trend. The total fall of water level was 12 feet from the beginning of June to the middle of September.

Mr. A. Wood reported his measurements of water level in King Township, Con. III, Lot 27, from January 1942 to December 1951. Most of these records were taken in the winter months, when the water table is usually low, and they accordingly do not give a complete picture.

The repeated measurements of the 42 selected non-artesian wells of the Holland River Watershed in 1952 confirm the general rule of lowering of water level during the summer months. The amount of lowering varies from 0 to 24 feet in the wells measured. The less important fluctuation is in the sandy lowlands and depressions, the highest in hilly clay or till areas.

These results indicate that, if a regional survey of water table in wells is to be carried out, measurements should be made during as short an interval as possible, since, if such measurements are recorded at different times through the season, the resulting profile-sections or contour maps will represent data based upon a mixture of normally high and low levels.

2. Changes of Water Level from 1937 to 1952

Seasonal changes of water level in wells may be so great (up to 24 feet, see the previous discussions), that changes from one year to another could be determined only by measuring either the highest level every year or the lowest one. The month of the highest or the lowest level may vary; usually a relatively high level occurs in the late spring or early summer, and a low level in the fall.

One of the ground-water parties of the Geological Survey of Canada measured a great number of wells of the Holland River Watershed in June and July, 1937. Most of them were remeasured in the same months of 1952. As the winter and

spring months before both surveys were similar in respect to precipitation (above average) and both survey seasons were warmer than average, it seems justifiable to compare the measurements of these two years. It should be kept in mind, however, that the years before 1937 were drier than those before 1952.

(a) Dug Wells

First the results of the remeasurement of 151 dug wells, mostly non-artesian, have been compared (see Fig. 21a). The greatest number of these wells (nearly 60 per cent) show, from 1937 to 1952, variations between +4 feet and -1 foot. A smaller proportion shows an increase of water of 8 to 10 feet. Thus most wells show an increase of water from 1937 to 1952. The main reason for a generally higher water level in 1952 may be the already mentioned higher precipitation during the years before 1952, compared with the years before 1937 (see Fig. 3).

The wells with increases of 7 to 14 feet (average at 8 to 10 feet) are located either in the central or western part of the Holland River main depression between Aurora and Newmarket or on the interlobate moraine in the eastern part of the area. Most of them are found to be non-flowing artesian wells at the present time, but with a relatively poor aquifer in many cases (a thin layer of sand and gravel in clay or till). Some of them were considered as non-artesian wells in 1937, as their water table did not reach the confining layer. The relatively high precipitation during the years before 1952 caused a gradual accumulation of ground water, until it filled the aquifer and became confined there under pressure. The pressure and the resulting water level in wells increased most rapidly at the moment when the local storage space became filled up to its capacity and ground water began to accumulate at higher levels towards the intake area. The lower the capacity of such a confined aquifer, the greater the increase due to continuous accumulation of water in it.

FIG. 21

CHANGES OF WATER LEVEL IN WELLS
FROM JUNE – JULY 1937 TO JUNE – JULY 1952
HOLLAND RIVER WATERSHED

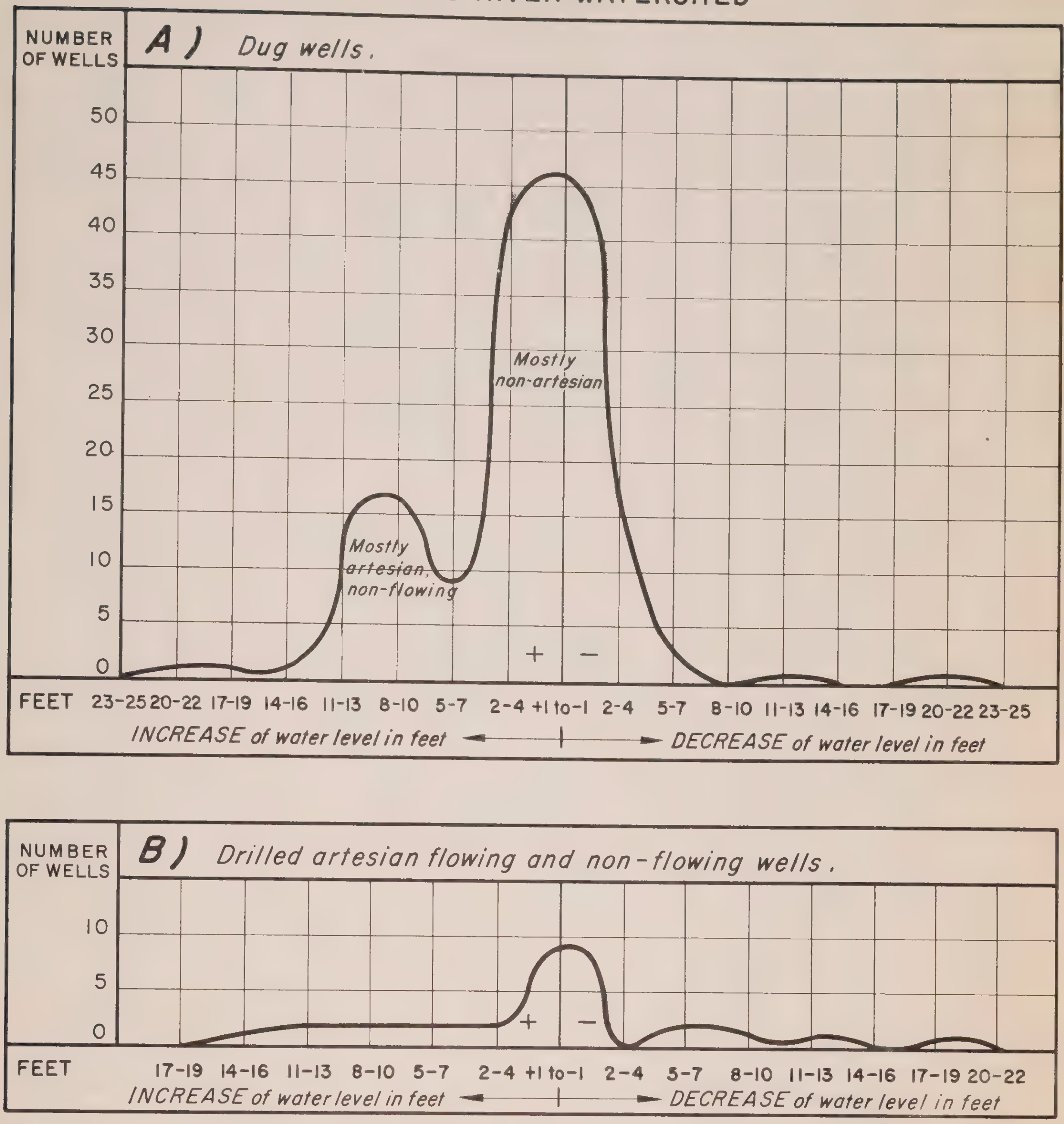
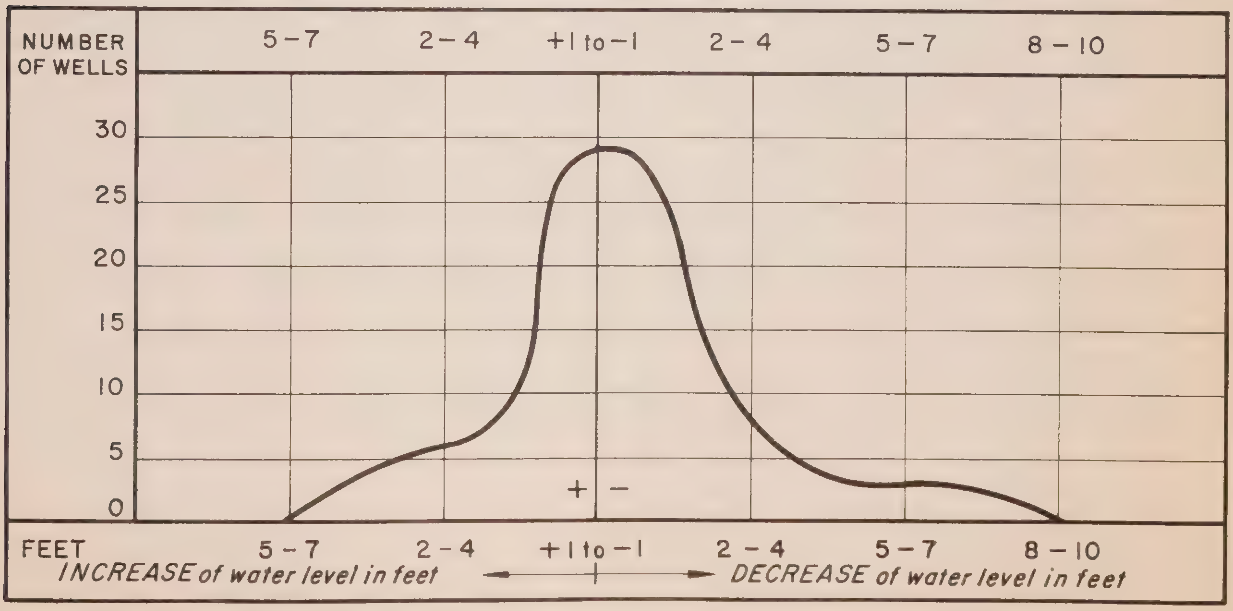


FIG. 22

CHANGES OF WATER LEVEL IN NON-ARTESIAN DUG WELLS
FROM JUNE 1948 TO JUNE 1952 IN THE NORTHERN PART OF
THE HOLLAND RIVER WATERSHED (GWILLIMBURY EAST TOWNSHIP)



(b) Drilled Wells

It was quite impossible to measure most of the drilled wells. Thus we had to rely upon the information given by their owners. The number of wells in which a change between 1937 and 1952 has been either reported, or measured in feet, is only 23, and their depth varies from 60 to 181 feet. The general trend of their changes is similar to that of dug wells: two-fifths of the wells had practically no changes (+1 to -1 foot). increase was reported in another two-fifths and decrease in one-fifth (see Fig. 21b).

The greatest increase of water level is in the relatively shallow drilled wells (50 to 70 feet deep), which belong to the same group as the non-flowing artesian dug wells with a high increase of water-level from 1937 to 1952 (see the discussions in the preceding subsection).

Lowering of the piezometric surface by 1 to 19 feet has been reported or measured, south, south-east and east of Newmarket (see p. 40), and near the new well of the Ontario Hospital. As these changes have been caused by increased pumping of certain wells and not by climatic factors, they will not be discussed in this chapter. Another factor, causing lowering of artesian pressure, may be the permanent overflowing of wells (see p. 39 - Smith's well).

(c) Conclusion

Most of the wells either do not show any appreciable change of their water level from 1937 to 1952 or they have a slight increase, particularly the non-artesian and the deeper artesian wells (except those in which the artesian pressure has been lowered by increased pumping of neighbouring wells, by their own overflow, or by increased consumption). The greatest increase of water occurs in those relatively shallow artesian wells which have a confined aquifer with low capacity.

3. Changes of Water Level from 1948 to 1952

Forty-six non-artesian and non-flowing artesian dug wells which were measured in June 1948 were remeasured in June 1952 (see Fig. 22). More than half of them did not show any appreciable change: their level was either the same or lowered by 1 foot as compared with 1948. The number of wells that show a slight tendency to be lower is greater than the number that show an increase. This may be explained by the very high precipitation in the year before 1948, higher than during the year before 1952 (see Fig. 3), though the difference is not great.

Information on changes of the artesian pressure in deep wells since 1948 was obtained only from four well-owners. All of them indicated decreases of 2 - 10 feet. The number of these reports is too small and the period from 1948 to 1952 too short for drawing reliable conclusions.

4. The Maximal Observed Fluctuations of Water Levels in Wells

Many well owners supplied the ground-water parties of the Geological Survey of Canada and the Conservation Branch with information re the maximal fluctuations of water levels in their wells: the depth of the highest and the lowest level. The water level of August or September, 1936, was in many cases the lowest level and the level of the late spring of 1952 was claimed by several farmers as the highest.

The following comparison gives the extreme fluctuations between the driest season of the driest year and the wettest season of the wettest year. An attempt has been made to group the wells according to the reported aquifer; sand, gravel, clay and till.

(a) Non-Artesian Wells

Fig. 23 is based upon data from 451 non-artesian wells. It shows that a large proportion of these wells have low fluctuations of their water level: 0 - 5 feet; and that over 50 per cent of all non-artesian wells fluctuate within less than

FIG. 23

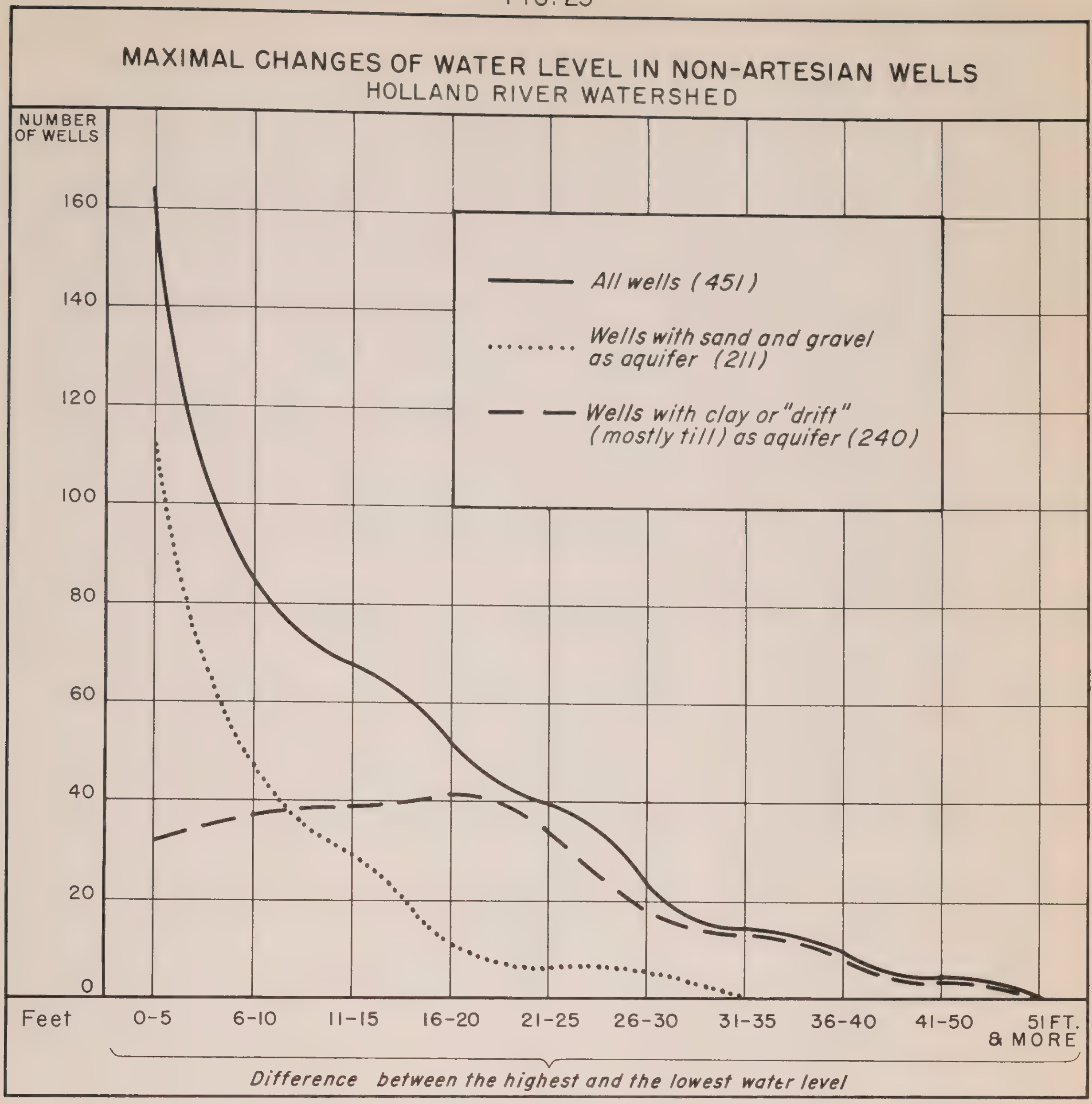
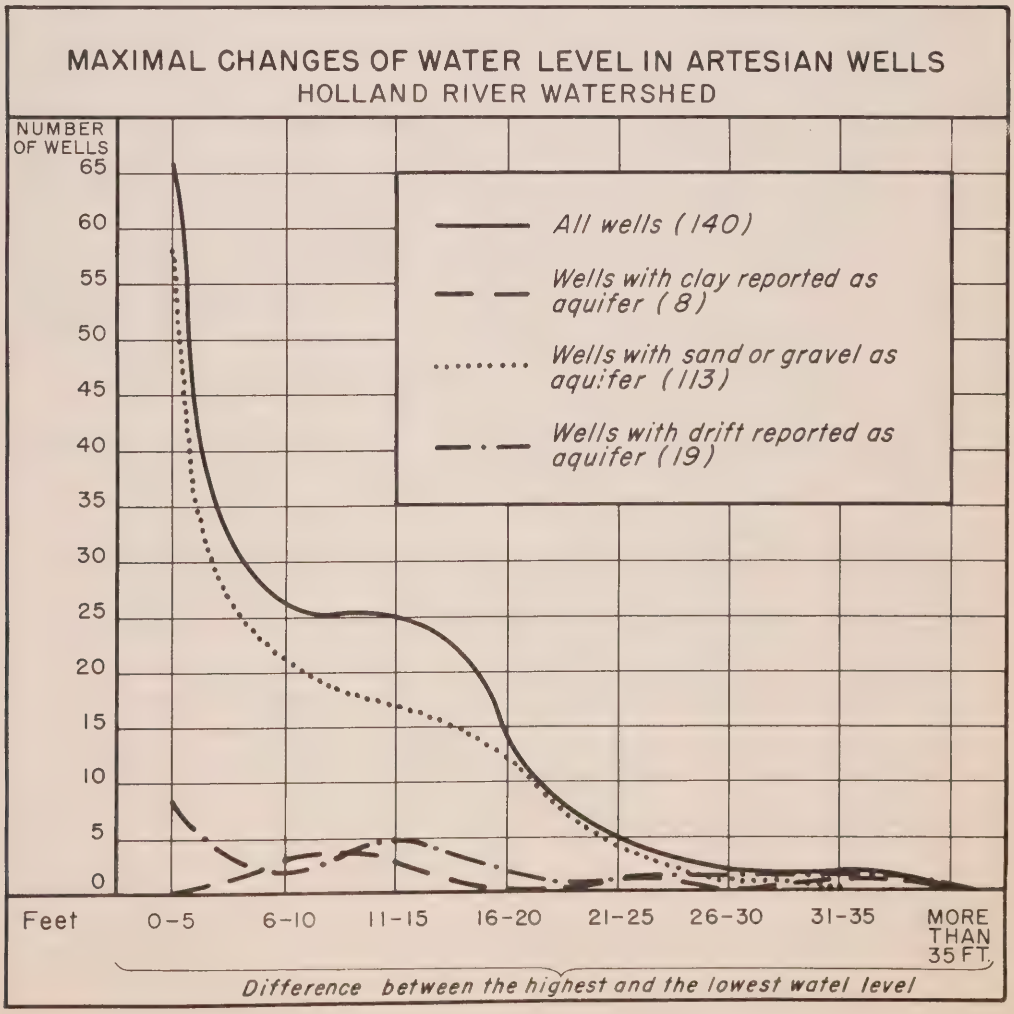

MAXIMAL CHANGES OF WATER LEVEL IN NON-ARTESIAN WELLS
HOLLAND RIVER WATERSHED
NUMBER OF WELLS
160
140
120
100
80
60
40
20
0
All wells (451)
Wells with sand and gravel as aquifer (211)
Wells with clay or "drift" (mostly till) as aquifer (240)
Feet
0-5
6-10
11-15
16-20
21-25
26-30
31-35
36-40
41-50
51 FT. & MORE
Difference between the highest and the lowest water level

FIG. 24


MAXIMAL CHANGES OF WATER LEVEL IN ARTESIAN WELLS
HOLLAND RIVER WATERSHED
NUMBER OF WELLS
65
60
55
50
45
40
35
30
25
20
15
10
5
0
All wells (140)
Wells with clay reported as aquifer (8)
Wells with sand or gravel as aquifer (113)
Wells with drift reported as aquifer (19)
Feet
0-5
6-10
11-15
16-20
21-25
26-30
31-35
MORE THAN 35 FT.
Difference between the highest and the lowest watel level

10 feet. The range of fluctuation is wider in quite a number of wells, and in some is as much as 50 feet.

It was determined that 211 of the wells under investigation have sand or gravel bottom, or sand and gravel layers as aquifers; 120 were dug in clay (or clay-like deposits, without any sand layer reported); and the rest in "drift", probably mostly till. For this reason, the last two groups were studied together in order to find whether a difference exists between wells with sand or gravel aquifers, and wells dug in clay or till. More than 50 per cent of the sand and gravel wells have fluctuated less than 5 feet. The clay and till wells do not show a well-defined point of maximum frequency because this group is not homogeneous. The peak of their distribution is about 18 feet, much higher than for the sand-gravel wells; and all the wells with fluctuations of more than 30 feet are found in the clay and till group, More than 50 per cent of the clay and till wells have fluctuated by 11 to 25 feet.

Therefore it is apparent that high fluctuations (up to 50 feet) are found mostly among those non-artesian wells which have been dug in clay (see Fig, 8 and 9) or till (probably in some cases with thin layers or lenses of sand or gravel). The non-artesian wells with a sandy or gravelly aquifer have a much lower range of fluctuation.

(b) Artesian Wells

Fig. 24, showing the extreme fluctuations of the artesian dug and drilled wells, is based upon a smaller number of reports - 140.

The general trend of this diagram is similar to that of non-artesian wells: more than a half of the wells have fluctuated within less than 10 feet; the greatest reported fluctuation is 40 feet. One hundred and thirteen of the artesian wells were reported to have sand and gravel aquifers, eight have clay, and nineteen "drift". It is difficult to imagine a deep artesian well with a fair supply receiving its

water from clay. Thus it seems probable that even the "clay" wells have encountered a gravelly or sandy layer or lamina, but probably thin.

More than 50 per cent of the sand and gravel wells have fluctuated less than 5 feet. The "clay" wells show a fluctuation of 6 - 15 feet occurring most frequently. Wells with "drift" reported as aquifer probably include both the above groups and therefore have two modal points, one with fluctuations of 0 - 5 feet, the other with a range of 11 - 15 feet.

(c) Years of Increased Fluctuations

More than one hundred well-owners supplied information on the years with most extreme fluctuations. Thus more than 60 well-owners have stressed the strong drop in the levels of non-artesian and artesian wells in 1936, and many of them pointed out the subsequent rise, leading to a normal water level in 1937. Sixteen reported a fall beginning as early as 1929, 1930, 1931 or 1932 and culminating in 1936.

Other years of reported lowering of water level were: 1949 and 1950 (reported by five well-owners); 1933, 1943, and 1947 (by two well-owners); 1917, 1930, 1948, and 1951 (each by one well-owner).

Several reports mentioned a rise of water in wells during the last one or two years.

If a given year was mentioned by one or two well-owners, it does not necessarily indicate a general rise or fall that year; but tens of reports may represent a regional fluctuation, like those of 1936, 1930 - 1936, 1937, 1952.

It is interesting to note that at least five well-owners, mostly from the eastern sandy part of the watershed, have observed no lowering of the water level even during the dry year of 1936.

Earthquakes of 1925 and 1935 were given by three farmers as the explanation of sudden changes of water table. Two of them mentioned a fall, one a rise, of water in their wells.

These wells are located on the high morainic area along the western border of the Holland River Watershed (King Township, Cons. II and III, Lots 29 and 30).

(d) Conclusion

Maximal fluctuations between extremely dry and wet years vary from 0 to 40 feet in the wells of the Holland River Watershed, with similar trends in both non-artesian and artesian wells. Wells with a good sand or gravel aquifer fluctuate less (mostly 0 - 5 feet) than wells with till or clay as an aquifer or with thin laminae of sand or gravel in till or clay. The greatest fluctuations are in those non-artesian wells which have been dug or drilled in clay or till without reaching a proper sand or gravel aquifer.

As consumption of water during the last decades has generally increased, most well-owners have become aware that shallow wells, dug in clay or till, are not sufficient; and they tend to replace such shallow wells by deeper, mostly drilled ones.

5. Long-Period Observations on Changes of Water Levels in Wells

During the field surveys of wells, their owners were asked also to report their observations on the general trend of changes of water level: whether falling, rising or remaining approximately the same so far as they can remember (except for seasonal and other fluctuations). It was realized that these reports were often subjective, but if the same statements were repeated many times, they would become more reliable.

Ninety-five reports of this kind were gathered describing the trend of changes of water level in wells for periods longer than twelve years. Eighty per cent of these well-owners reported that no general lowering of water level in their wells, or decrease of flow from springs, had been observed; 20 per cent had observed a decrease.

Some of the observations re the stability of water table cover a long period of time - since the end of the last century, others only a relatively shorter period.

The 77 reports describing no change are based upon observations, as follows:

6 - since the end of the 19th century (since 1870, 1882, 1890, 1897)

7 - " " 1st decade of the 20th century (1900 - 1910)

15 - " " 2nd " " " " " (1911 - 1920)

16 - " " 3rd " " " " " (1921 - 1930)

33 - during the last 15 to 20 years.

The eighteen reports showing decrease of water level cover only the last 12 to 30 years (since 1920, 1924, 1925, 1930, 1940) and the greater part of them are from the central and western part of the watershed. The main reason given for lowering of water level, particularly in artesian wells, has been the increased pumping and consumption of water in their vicinity, e.g., Newmarket, Ontario Hospital. Silting of wells may be another reason.

The conclusion is that no general lowering of the water table of non-artesian wells has been reported for periods as long as 50 - 80 years. Some lowering of the artesian pressure occurs around places of increased pumping, particularly Newmarket. This lowering is by no means alarming and there are still many wells flowing.

6. <u>Summary of Changes of Water Levels in Wells</u>

No general lowering of the water table has been found either by repeated measurements of wells or by long-time observations as reported by many well-owners.

Seasonal fluctuations of some non-artesian wells are nearly as high as fluctuations of longer periods - between dry and wet years. Heavy seasonal fluctuations or those between dry and wet years have been observed particularly in wells which have not encountered a good sandy or gravelly

aquifer. The least fluctuations are in the sandy eastern part of the Holland River Watershed.

Deep artesian wells show some decrease of the artesian pressure in the areas with increased consumption, for instance at Newmarket. The lowering there is not alarming yet, and sufficient ground water is available for further development of new wells.

CHAPTER 10

TEMPERATURE OF WATER IN WELLS AND SPRINGS

The ground-water parties of the Geological Survey of Canada have measured the temperature of some wells and springs in August and September, 1936, along the south side of the watershed and in June 1948 in its northern part.

As the ground-water report on Whitchurch Township (Hainstock, Owen and Caley, 1952) does not mention results of these measurements, they are summarized in Fig. 25 and included in this paper.

Fig. 25a shows that the shallow wells (0 - 20 feet deep) had a slightly higher temperature (mostly 46° - 47°F.) than the deeper wells or springs, in August - September, 1936. Some of the shallow wells with a relatively low temperature may be spring-fed.

The temperatures of June 1948 appear to be higher by about two degrees (see Fig. 25a) in deeper wells, than those of August - September, 1936. As the wells in which the temperatures were measured in 1948 were not the same as those from which the earlier data were taken, it is difficult to compare the measurements or to give any explanation.

CHAPTER 11

CONCLUSIONS

1. No general lowering of water table has been found either by repeated measurements of wells since 1936 or by long-time observations, reported by 95 well-owners.

2. The principal changes of water levels in wells are due to climatic fluctuations between dry and wet years, and between dry and wet seasons every year.

3. The greatest fluctuations are recorded in shallow wells, dug in clay in the central and the northern part of the Holland River Watershed.

4. Deep artesian wells show some decrease of the artesian pressure in the areas with increased consumption of water, for instance at Newmarket. The lowering is not yet alarming, and sufficient ground water is available for further development of new wells.

5. Some lowering of artesian pressure appears to be due to unnecessary overflow of several flowing wells.

6. The relatively high amount of chlorides in the artesian water at Newmarket may derive from the Holland River.

7. The sandy areas in the east and south of the watershed are the principal intake areas for the artesian aquifers of the Holland River Watershed.

8. Care should be taken in all densely populated areas to avoid contamination of wells and ground water by septic tanks, sewage and garbage dumps.

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(2) HAINSTOCK, H.N., OWEN, E B., and CALEY, J.F., 1952. Ground-water Resources of Whitchurch Township, York County, Ontario. G.S.C. Water Supply Paper No. 320.

(3) WATT, A.K., 1952. Ground Water in Ontario, 1947. Ontario Department of Mines, 16th Annual Report, Vol. LX, p.xi, 1951.

(4) CHAPMAN, L.J., and PUTNAM, D.F., 1951. The Physiography of Southern Ontario. Ontario Research Foundation.

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(9) METEOROLOGICAL DIVISION, DEPARTMENT OF TRANSPORT, 1944-1950. Monthly Record, Meteorological Observations in Canada (and Newfoundland).

(10) METEOROLOGICAL DIVISION, DEPARTMENT OF TRANSPORT, 1947. Climatic Summaries of Selected Meteorological Stations in the Dominion of Canada.

(11) METEOROLOGICAL SERVICE, DOMINION OF CANADA, 1951-1952. Monthly Weather Map.

WILDLIFE

CHAPTER 1

IMPROVING THE LAND FOR WILDLIFE

There are many varied types of land in the Holland Watershed. The requirements of food and cover vary greatly for different species of wildlife.* The recommendations here listed are therefore those which can be most generally applied by the landowner.

1. Woodlands

The elimination of grazing of woodlots would be the most useful single measure in improving the wildlife environment. Large-scale reforestation plans are included in the Forestry report. In plantations, up to about the tenth year from planting, the entire planted area is valuable for wildlife. But large blocks of coniferous trees will, at least after the twelfth year from planting, have little or no undergrowth and will, apart from their edges, be comparatively sterile as far as upland game and most forms of wildlife are concerned. The chief improvements to be expected will therefore come from good management of the farm woodlot. Selective cutting is both sound forestry practice and good planning for wildlife. Landowners who have woodlots in which the crown canopy has closed over considerable areas, and who wish to produce a proper environment for wildlife, will find that release cuttings, slashings to stimulate sprout growth, thinnings and felling timber for sale will improve rather than retard the carrying capacity for wildlife. Construction of brush piles from cuttings is recommended where rabbits are desired, two or three such brush piles per acre being the normal spacing.

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* The vegetation of the uncultivated section of the Holland Marsh and its importance as a wildlife habitat will be the subject of a separate report. The small area of the marsh included in the watershed is therefore not discussed in this report.

2. Cultivation Practices

All good farming practices which make a more luxuriant vegetation will improve the farm environment for wildlife. A few special practices will give more specific benefits. Strip-cropping, described elsewhere in this report, is of particular value since by this means no extensive area is denuded of cover at one time by harvesting. In the less flat parts of the watershed, filter strips, either above water-diversion terraces or used as emergency waterways, provide travel lanes and nesting cover for wildlife. Cover crops such as the clovers provide a habitat and food for wildlife in areas that would otherwise be barren during the winter months.

The elimination of brushy fencerows is now becoming more common on the Holland Watershed. Those who are interested in wildlife improvement will find that the inclusion of a few field boundary hedges on the farm will moderate the effect of winds on crops, serve as travel lanes and cover for wildlife, and harbour large numbers of songbirds which help to control insect pests. Inevitably the presence of boundary hedges on a farm tends to encourage the growth of weeds. This is the price that must be paid for improved wildlife conditions. <u>Rosa multiflora</u> is an excellent hedge-forming shrub. It has a tendency in Southern Ontario to die back in winter, but rapidly forms a dense hedge, which is reported to be proof against cattle and hogs. It provides both cover and food and does not exhaust the nearby cultivated ground. However, in view of its questionable hardiness it should not be planted on the Holland Watershed without consultation with the nearest biologist or forester of the Department of Lands and Forests.

3. Cover Patches

Field corners are frequently barren of crops, Therefore a fence crossing which embraces the corners of four

fields may be made into a haven for ground-nesting species by planting a few trees and shrubs and protecting them. It is important to rid such areas of useless weeds by crowding them out with useful species such as white sweet clover or the normal climax type of open vegetation, which is bluegrass.

4. Ponds and Streams

The importance of water to wildlife is often forgotten. Many farms have at least one low spot where a small amount of work with a scoop will provide a dam and a pond to provide nesting and feeding sites for water and marsh birds. If possible, ponds for wildlife should be separate from those intended for cattle or for fish. Willow cuttings pushed in the ground around such a hollow will rapidly provide wildlife cover. New water areas are usually very rapidly invaded by aquatic plants, but additional species may have to be introduced. No extensive duck food studies have been made in Southern Ontario. Wild rice may be introduced, but since it is not well adapted to wide variations in water levels, being often sterile in fluctuating waters, it cannot be considered as certain to succeed. The idea has long been current, and fostered by many sportsmen's organizations, that the planting of wild rice is the answer to the problem of how to attract ducks to any area. The fact is that wild rice is of little significance to ducks in Canada except in the fall, and does not provide good cover or nesting sites. The following species which may be easily obtained are recommended as certain to be valuable duck foods. If none of them occur in ponds or shallows with good cover for ducks they can be introduced.

Sago Pondweed	Potamogeton pectinatus L.
Red-Head Pondweed	Potamogeton Richardsonii (Ar. Benn.) Rydb.
Wild Millet	Echinochloa crusgalli (L) Beauv.
Japanese Millet	Echinochloa frumentacea (Roxb) Link
Wild Celery	Vallisneria americana Michx.
Knotweed	Polygonum pensylvanicum L.
Water-Smartweed	Polygonum coccineum Muhl.
Three-square	Scirpus americanus Pers.
Great Bulrush	Scirpus validus Vahl., var. creber Fern.

Those who are interested in farm ponds for wildlife will find very useful details of the various types of pond and methods for constructing each type in a booklet "Farm Ponds" which is available from the Conservation Authority. Farm Ponds differ from those intended for wildlife in that care is usually taken to prevent the growth of aquatic vegetation in a farm pond intended only for watering stock or fire protection purposes. Otherwise the construction and details of ponds for wildlife should follow one of the types there described.

CHAPTER 2

FISH

1. Introduction

The purpose of this survey was to make a preliminary examination of the waters of the drainage basin and to classify them as to their present suitability for fish, and secondly to make recommendations for possible improvements.

2. Methods

The river and its tributaries were visited at fifty "stations", most of them at road crossings. The stations were from half a mile to three miles apart on each stream course. The topographic features of the valley, and the erosion, vegetation, volume of flow, turbidity, temperature, and type of bottom were listed for each station. At all suitable stations collections of the aquatic insects and other invertebrates were made. At most of the stations collections of fish were also made. The collections were later examined and classified, and were used in zoning the various sections of the river, as shown on the accompanying map.

The aquatic insects such as mayflies, stoneflies and caddisflies were most useful for this purpose, since many of them are reliable indicators of the stream conditions at the critical time of year. Some species are confined to waters which remain cold and clear in summer, such as trout waters. Others are indicators of permanent flow or of polluted water or of the maximum summer temperature of the water. Thus the potentialities of a stream for particular species of fish are indicated. The fish collections substantiated these findings at their particular stations.

Since the procedure here used follows that of all previous river surveys by the Department of Planning and Development, it allows close comparisons of the characteristics of many rivers. The present criteria and methods evolved from more intensive year-round research carried out

on parts of the Nottawasaga River and Algonquin Park streams, already reported on *,†,**, and from other unpublished research data made available for this work.

The great majority of the stations could be examined only once during the survey. It was therefore necessary to rely on deductions made from the presence or absence of species which extensive previous tests have shown to be reliable indicators.

3. The River Valley

The conditions which determine the kinds and numbers of fish inhabiting a river system are in part a product of the physiographic conditions of the watershed. Only the major features determining the river's course and condition are mentioned here. The headwaters south, east and west of Aurora lie in the sands, gravel and boulder clay of the interlobate kame moraine. Much of this land is uncultivated or of low agricultural value. The middle section of the river valley crosses the richer soils of the uneven Schomberg clay plain. In its lower sections the river traverses a sand plain and later the clay and peat of the open section of the Holland Marsh.

4. Flow

The permanence of flow of the various branches and tributaries is shown on the accompanying map "Biological

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* Ide, F.P. The Effect of Temperature on the Distribution of the Mayfly Fauna of a Stream. University of Toronto Studies, Biology 39, Publication Ontario Fish Research Laboratory 50. 1935.

† Ide, F.P. Quantitative Determination of the Insect Fauna of Rapid Water. University of Toronto Studies, Biology 47, Publication Ontario Fish Research Laboratory 59. 1940.

** Sprules, W.M. An Ecological Investigation of Stream Insects in Algonquin Park, Ontario. University of Toronto Studies, Biology 56, Publication Ontario Fish Research Laboratory 69, 1947.

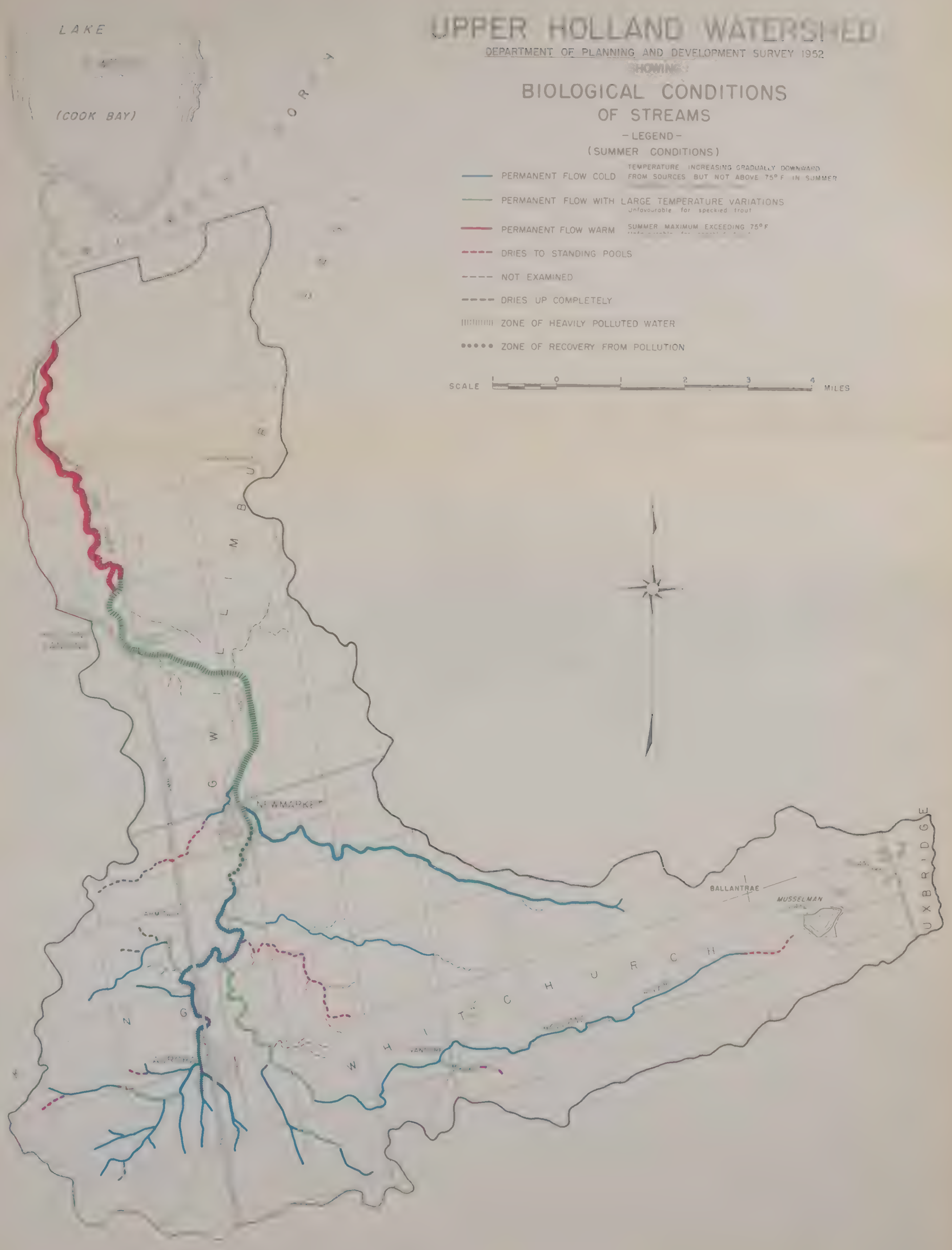
Conditions of Streams". The map shows that very few of the watercourses dry up completely in summer. The river receives most of its water from springs which rise on the northern slopes of the moraine. Some of the small kettle lakes, notably Musselman and Van Nostrand's lakes, also contribute water in the spring and early summer. Estimates of the flow of the river near Holland Landing in late summer were from 15 to 20 cubic feet per second.

The three chief branches of the river are the main branch, flowing west from a point near Musselman Lake, the Aurora branch and the branch joining the river from the east at Newmarket. When the flows were examined in August 1952 these were respectively 6 c.f.s., 2.5 c.f.s. and 4 c.f.s. The remaining tributaries are insignificant. The lower part of the river also receives a considerable volume of flow (about 2 c.f.s.) from the run-off from several artesian wells.

5. Temperature

The maximum summer temperatures to be expected in the various branches, and other temperature characteristics affecting the distribution of fish in the Holland River, are shown on the accompanying map. The differences in thermal conditions shown result from a variety of causes such as volume of flow, amount of shade and origin of the water, which cannot be individually shown on the map.

As the river is short there is little accumulation of heat in it from day to day and consistently high temperatures occur only in the slow-flowing reach below Holland Landing. Many of the tributaries which are fed by permanent springs have in them the organisms on which trout are dependent, but the flow is so small (apart from the three sections referred to above) that most of the sections suitable for trout are restricted and capable of supporting only a few fish.


UPPER HOLLAND WATERSHED
DEPARTMENT OF PLANNING AND DEVELOPMENT SURVEY 1952
SHOWING
BIOLOGICAL CONDITIONS
OF STREAMS
- LEGEND -
(SUMMER CONDITIONS)
PERMANENT FLOW COLD
TEMPERATURE INCREASING GRADUALLY DOWNWARD FROM SOURCES BUT NOT ABOVE 75° F IN SUMMER
PERMANENT FLOW WITH LARGE TEMPERATURE VARIATIONS
unfavourable for speckled trout
PERMANENT FLOW WARM
SUMMER MAXIMUM EXCEEDING 75° F
DRIES TO STANDING POOLS
NOT EXAMINED
DRIES UP COMPLETELY
ZONE OF HEAVILY POLLUTED WATER
ZONE OF RECOVERY FROM POLLUTION
SCALE
1 0 1 2 3 4
MILES
LAKE
(COOK BAY)
NEWMARKET
BALLANTRAE
MUSSELMAN
UXBRIDGE

6. Pollution

The common sources of pollution in the rivers of Ontario are raw and treated sewage, milk wastes from creameries and cheese factories, various organic and inorganic industrial wastes, and cattle droppings. Pollution effects are of two kinds: those affecting public health and those which are not a hazard to human health, but which are offensive to people or harmful to fish and other aquatic organisms. The first type is measured by the concentration of an indicator organism (the bacillus E. coli). The second type is measured in terms of poisonous compounds which may be introduced into the river and in terms of oxygen depletion of the water and its rate of recovery.

The effects of cattle using the streams were noted at 23 stations or almost fifty per cent of the stations examined, but none of the streams could be considered as seriously affected by cattle pollution. Recovery of streams from cattle effects is usually rapid below the source of pollution.

The chief sources of pollution of the Holland River are tannery wastes, sewage effluents and milk-processing plants. The river takes the wastes from three tanneries and two milk-processing plants, the effluent from the Aurora sewage plant, untreated sewage from Newmarket, and the debris from a number of other miscellaneous small industries.

Tannery wastes have three major effects on a river:

(a) They produce very disagreeable odours, particularly if sodium sulfhydrate is one of the chief compounds used

(b) Unless the solids in suspension in the water are precipitated or settled in a settling basin, a great deal of sediment goes into the river, gradually silting it up and rendering the river bottom sterile.

(c) They greatly upset the ogygen balance in the river, since the organic wastes use up whatever oxygen is in the water, making it impossible for many plants and most aquatic life to survive.*

These wastes are not usually treated, other than by removal of some of the solids. There are very strong alkaline (lime) solutions and very strong acids used, but the spent acid liquors are normally in very weak solution and do no harm. Great amounts of water are needed; for example one leather company uses about 250,000 gallons per working day. The chief disadvantage from tannery wastes is the fact that the effluent varies greatly from hour to hour and day to day, from almost pure water to strongly alkaline water or to water with a high concentration of organic matter.

All three tanneries in the watershed use basically the same tanning method, known as "chrome tanning", and all make chiefly calf leather. All three sell most of the fleshings or organic debris to glue factories, but a part escapes into the river. Below tanneries where the wastes are untreated the streams are usually completely sterile, but lower down the streams there are areas known as "recovery zones" where the fertilizing effects of the organic materials cause a great profusion of aquatic plants.

Waste disposal from a tannery at Aurora has long been a problem. The wastes were at one time taken into the municipal sewer and treated at the disposal plant, but more recently were discharged directly into the Holland River after preliminary treatment.

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* A minimum oxygen content of 5 p.p.m. is listed by Ellis, (M.M.Ellis, "Detection and Measurement of Stream Pollution", U.S. Bureau of Fisheries Bulletin No.22, 1937) as "the lower limit of dissolved oxygen, if the complex is to maintain a desirable fish fauna under natural river conditions".

The odours in this stream were a considerable nuisance to many nearby residents. As of October 1953 the effluent (up to 100,000 gallons per day) was again being treated at the municipal disposal plant, and the stream from the tannery to the municipal treatment plant effluent is now clear. The odours are therefore (October 1953) not a serious nuisance. While the treatment plant, which is of the activated sludge type, is much over-loaded, the present arrangement is at least an improvement over the previous situation. (The B.O.D. of the river just below the outfall of the sewage treatment plant is reduced from about 300 to 50-75.) The building of a digester and enlargement of the present plant to accommodate the tannery and give greater sewer coverage is under discussion by the Municipal Council.

Another major source of pollution is a dairy. A chicken-killing plant which also pollutes the river is reported to be installing vibrating screens and a septic tank. There does not appear to be adequate space for the necessary field tile beds in this area.

Considering the numerous efforts to gain control of pollution in Aurora it might have been expected that a similar effort would be made in Newmarket. This has not been done. There has to date been little or no improvement in the extent of pollution of the river at the tannery at Newmarket, which passes an effluent of up to 250,000 gallons per day into the river. The removal of fleshings and other treatment appear quite inadequate. The river is both sterile and malodorous for a long distance downstream from Newmarket. Negotiations between the company and the Town of Newmarket with respect to a joint arrangement concerning a treatment plant have made little or no progress. It is recommended that the Conservation Authority apply to the Pollution Control Board of Ontario to have this problem given immediate attention. There have been numerous complaints concerning the condition of the river both

in Newmarket and below it. The Conservation Authority might also recommend the immediate enlargement of the Aurora treatment plant so that it can treat at least the present volume of wastes efficiently.

At Holland Landing the effluent from a third tannery provides a serious nuisance. Here again there is little attempt to settle the solids or to control the B.O.D., or the odour, for which the addition of polycide would have a good effect.

7. Fish Distribution

The following species of fish were taken in the river and tributaries of the watershed during the survey:

† Fishes of the Upper Holland River and Tributaries

(Based on collections made during the 1952 survey)

* Eastern speckled trout	*Salvelinus fontinalis* (Mitchill)
* Common white sucker	*Catostomus commersonnii* (Lacépède)
* Carp	*Cyprinus carpio* Linnaeus
* Creek chub; horned dace	*Semotilus atromaculatus* (Mitchill)
Blacknose dace	*Rhinichthys atratulus* (Hermann)
Longnose dace	*Rhinichthys cataractae* (Valenciennes)
Redbelly dace	*Chrosomus eos* Cope
Common shiner	*Notropis cornutus* (Mitchill)
Blackchin shiner	*Notropis heterodon* (Cope)
Fathead minnow	*Pimephales promelas* Rafinesque
* Brown bullhead	*Ameiurus nebulosus* (LeSueur)
Mud minnow	*Umbra limi* (Kirtland)
* Pike	*Esox lucius* (Linnaeus)
Yellow perch	*Perca flavescens* (Mitchill)
Iowa darter	*Poecilichthys exilis* (Girard)
* Pumpkinseed	*Lepomis gibbosus* (Linnaeus)
* Bluegill	*Lepomis macrochirus* (Rafinesque)
Muddler	*Cottus bairdii* (Girard)
Brook stickleback	*Eucalia inconstans* (Kirtland)

The distribution of the major game fish species is shown on the accompanying map. Maps showing the distribution of every species recorded in the river are available for reference.

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* Species of particular interest to anglers are starred.

† The arrangement and names follow those of Dymond, J.R. A List of Freshwater Fishes of Canada East of the Rocky Mountains. Misc. Publ. No. 1, Royal Ontario Museum of Zoology, Toronto, 1947.

Speckled trout were found at six stations. They were common in the Bogarttown branch of the river and also occurred in the Vandorf Branch. The miller's thumb, a small fish generally considered an excellent indicator of water suitable for trout, was found at 17 stations on five tributaries, indeed in most of the tributaries above Newmarket (except the main stream to Aurora.)

The creek chub was the commonest fish, and was collected at half of the fifty stations examined. Perch were found only at Riverbend Park, and pike were common below this point. The brown bullhead (or catfish) was taken only in the Van Nostrand stream. This species is also reported from the river below Riverbend Park. Carp are abundant in the lower sections. The common shiner was found at only one station.

Of the bass family the pumpkinseed and bluegill were both found in the Van Nostrand stream and the bluegill also at Riverbend Park.

The Great Lakes muskellunge formerly entered the Holland Marsh in considerable numbers for spawning. It still commonly enters the Schomberg River and is occasionally reported from the Holland River above its junction with the Schomberg River.

Most of the other species found in the river were various minnows and other species of little interest to the angler.

8. Recommendations for Stream Improvements

The present survey was a reconnaissance survey only and cannot be expected to provide detailed plans for improvements. Little is definitely known concerning the present trend in the trout populations. In the absence of statistical data concerning fish populations, any recommendations are subject to error, but some suggestions may be made.

Most of the tributaries were found to be short of potholes, eddies and submerged logs. Small trout ponds could be constructed where there is a good flow. The outlet of each dam should be a pipe (with a screened inlet at the bottom of the pond) rising close to the normal surface level and there passing through the dam, so that cold water is drained from the bottom and the warmed surface water is not allowed to flow over the dam. The surface water in the pond serves as an insulating layer, and the water below the pond has scarcely been heated by its passage through the pond. The pipe should be of such a size as to discharge the minimum summer flow. In flood time the additional flow would pour over the dam at a suitable outlet.

On the smallest tributaries with trout water, owners of the stream should be encouraged to install low dams, and deflectors which will force the stream to dig holes. Many sections of the stream are lacking in shade trees. Owners should therefore be encouraged to make stream bank plantings. Alders or species of willows which do not spread should be chosen for this purpose. The cooling effect would thus extend the trout-producing sections of the stream.

The Conservation Authority might also greatly stimulate stream development by sponsoring the improvement of one or more streams, as a demonstration of what can be done, in lands to be acquired by the Authority for reforestation.

It is assumed of course that the introduction of fish into the watershed would be restricted to those parts of the river which are shown by the survey to be suitable habitats for the species concerned.

9. Farm Fish Ponds

There is ample room for improvement of this type of fishing. The chief research on management of farm ponds has been carried on in southern and warmer climates, and therefore the findings cannot be applied without qualification to an area having the climate of Southern Ontario, but some definite

recommendations may be made. Suitable methods for the construction of six types of farm pond are given in a bulletin, "Farm Ponds", which is available from the Conservation Authorities.*

Trout ponds have already been discussed. Their depth should be 10 feet or more in the deepest part. Spring flow of as low as half a cubic foot per second will maintain a pond of one acre. Speckled trout and brown trout do not normally reproduce in ponds and must be maintained by periodic restocking. Ponds cold enough for trout should not be stocked with mixed types of fish.

The second and commoner type of farm pond is the warm-water pond. Most farms have at least one low spot suitable for a fish pond. It is frequently good practice to have separate ponds devoted to wildlife and fish and to control the aquatic plants in the fish pond.

In managing warm water ponds for fish the following points should be kept in mind.

(1) A minimum depth of 15 feet over at least 25 per cent of the pond should be planned to avoid excessive winter kill, probably the critical factor in fish survival in farm ponds in Ontario.

(2) If suckers, carp or large numbers of minnows are already present in the pond, it is usually best to destroy all fish in the pond before stocking.

(3) It is often necessary to control existing aquatic vegetation. There are both mechanical and chemical methods available.†

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* An excellent handbook on the details of construction and management of farm fish ponds is "Fish Ponds for the Farm" by F. C. Edminster, published by Charles Scribner's Sons, New York, 1947. Some of the above information is abstracted from this bulletin. See also Ch. 1, p.4, of this section.

† Speirs, J. Murray. Summary of Literature on Aquatic Weed Control. Canadian Fish Culturist, 3:(4); August 1948.

(4) There have been few tests made in Ontario of the efficiency of applications of fertilizer in increasing the crop of plankton, the smaller aquatic invertebrates. The research now being carried out in this field may lead to application of fertilizers such as 8-8-4 becoming more general.

(5) Since many of the species commonly recommended for introduction grow very slowly in Ontario waters, research to determine the most satisfactory species in this province will be needed. New ponds and those in which the previous fish have been destroyed might be stocked experimentally with a combination of large-mouth bass (Huro salmoides) and bluegills (Lepomis machrochirus) at the rate of 100 bass and 1,000 bluegills per acre. Fishing should be deferred until some of each species have spawned successfully.